



OPEN for business

There has been a significant move within the industrial sector towards the use of open source software and, more recently, operating systems.

Mention 'open source' and it's likely that the word 'Linux' will pop up. But while a range of applications are using Linux in order to access a wider range of open source software, some companies believe it's not the best route to take.

One of these companies is Freescale, which bundled the Freescale MQX real time operating system in the recently announced MCF5225x microcontroller range. The aim, according to the company, was to provide a 'one stop software shop'.

John Weil is manager of Freescale's mcs software enablement group. He said MQX has been around for some time. "But it has been through a number of acquisitions and the name has come on and off the market in this time."

Weil said the OS is suitable for use in a range of applications, including industrial, consumer and automotive products. "It's real claim to fame," he observed, "is its scalability. It can be used in a 'cut down' format, all the way up to a fully functional system."

David Brook: "[The operating system is] flexible and it doesn't have restrictions on the numbers of tasks or the assignment of priorities."

Designers can now choose from a range of open source operating systems.

By Graham Pitcher.

The OS is not a stranger to Freescale's product portfolio: the OS has supported Freescale ColdFire and PowerPC processors since the late 1990s. "It has supported Freescale's 8 and 32bit microcontroller products, including the HC11 range, as well as more high end devices such as the PowerQUICC," Weil claimed. "And it's used on the PowerQUICC processors in laser printers, where it performs as a true deeply embedded rtos."

Returning to the flexibility aspect, Weil used the example of a network router. "If you're building a networking router," he

said, "you can include more models. The kernel can be configured from a few thousand lines of code to hundreds, depending upon the application."

The benefits? Weil noted: "One of the key problems which we're trying to solve is for those customers looking for open source solutions. However, 'open source' means different things to different people; the GNU Public License or using GNU tools, for an example."

He sees a problem in using apparently 'open source' software and operating systems. "Sometimes, users need to see the source code; sometimes they need a broader license, sometimes there are safety or audio requirements. All of these things mean there is a need to know where every line of code came from. What users want is vendors to provide traceability."

Weil believes customers who are thinking about using Linux should sit down and ask themselves why. "Is Linux overkill?" he asked. "Many designers will specify Linux because they believe it's the only way they can get network connectivity, for example. They think Linux has a low cost of ownership and believe the only way to go is Linux or buying a particular solution."

"When they use Linux, they often admit they thought the cost of ownership would be lower."

"It's an established operating system," said Jim Stuart, Freescale's industrial marketing manager EMEA, "with a big installed user base."

One of the other attractions, besides an apparent 'something for nothing', is the licensing model for MQX.

"It's simple," Stuart contended. "Customers acquire the source code free of charge and can use it 'as is' or modify it to suit their requirements. But, because of the licensing model, customers don't need to share any developments they make or extensions they create." Because of this, Stuart continued, it's 'corporate user friendly'. "Companies don't always want to share their IP with the community," he observed.



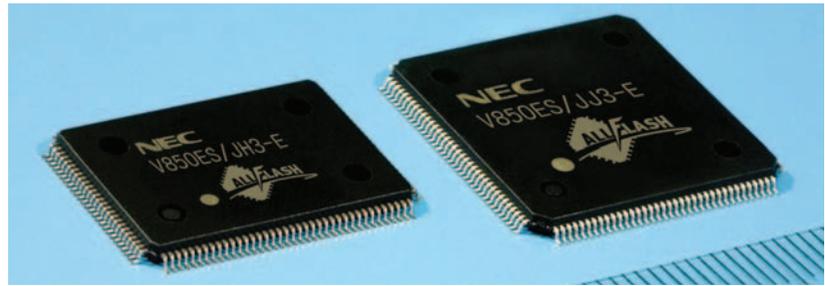


Free, Open and Safe

Another company pursuing the open source route is Wittenstein High Integrity Systems (HIS), which offers three versions of its rtos: FreeRTOS, which is available free of charge; OpenRTOS, a low cost, commercially supported version; and SafeRTOS, aimed at safety critical applications.

David Brook, head of sales and marketing, said: "FreeRTOS is an open source project which is free to use. But many companies need a commercial technical support licence, indemnifications and so we offer OpenRTOS. Finally, there's SafeRTOS."

Brook pointed out that SafeRTOS isn't a 'drop in' replacement. "The kernel works differently," he noted, "but there's



and the company has worked hard to minimise this, particularly things like queues, binaries and semaphores. "It's flexible," said Brook, "and it doesn't have restrictions on the numbers of tasks or the assignment of priorities."

"It's designed to be portable," Barry observed, "and has been written in C. You could get the footprint down to 3.5kbyte

Some 19 architectures are supported and the OS can be moved between them 'quite simply', as Barry noted. Currently, the company is seeing around 7500 downloads a month from its website. But Brook says the company isn't addressing a poorly served market. "There's plenty of OSs to choose from," he said. "But, as far as open source is concerned, you might find 25 big players."

"To a certain extent, we're riding on the back of growth in demand for ARM7 core."

Thomas Wagner, IAR Systems

a lot of compatibility."

Richard Barry is head of innovation for the company. He pointed out the OS has been certified by TuV to be compliant with IEC61508. "To be compliant, we had to make several changes, the most notable of which is that there is no dynamic memory allocation. In FreeRTOS, you can pass a null pointer and the system will crash. SafeRTOS will detect this and return an error code."

Code size is an important consideration

if you wanted to, but a typical configuration with optimisation will take up about 5kbyte, but it depends on the compiler. With everything included, it's about 10kbyte."

Development of the OSs has been in progress for some time. Success is coming from the growth in demand for microcontrollers. "To a certain extent," Barry noted, "we're riding on the back of growth in demand for the ARM7 core."

No need to share

Like Freescale, Wittenstein HIS is catering to those companies which don't wish to share code – which they would have to do under a GNU license. Brook noted: "One of the benefits of the OS is the way the code is moderated. We don't include any changes in the OS, although users can make changes and distribute it as they like."

There's a whole community of developers who take source code, modify it and share, but our 19 releases are moderated. Richard Barry goes into the code and makes sure it's efficient, tight and that he knows where every line of code came from.

Barry expanded: "The license is modified from the GPL approach. If you download FreeRTOS, you can keep your code confidential and you don't have to share it."

Meanwhile, support for the FreeRTOS approach has recently come from NEC Electronics Europe, which is making the OS available for use with its 16bit 78K0R and 32bit V850 microcontrollers (see picture above). Although NEC's microcontrollers are supported by a number of commercial RTOS', the company says support for FreeRTOS means developers have the flexibility to develop with an rtos of their choice.

Figure 1: MQX operating system components

