Open source opens doors for improved development

By Dr. Inder M. Singh

The complexity of today's embedded devices is causing a shift in how developers approach designing the software that drives these systems. Dr. Inder M. Singh will address how this shift is transforming the embedded landscape and explain how open standards, open source elements, and specific technologies such as Linux and Eclipse development tools are facilitating a more efficient development process.

An industry in flux

Today's embedded devices are more complex and incorporate richer feature sets than ever before. With more powerful hardware, pervasive network connectivity, and enhanced user expectations, embedded devices no longer are limited to single function, dedicated systems in which the embedded device does just one dedicated job. At present, embedded devices frequently have secondary or tertiary functions that enhance the primary function or sometimes allow for an entirely different purpose altogether. Moreover, the functionality of the device may often be dynamically altered, more like a personal computer than a traditional embedded device.

In addition to the increased richness and complexity of embedded software, development cycles are getting shorter all the time. Very often, there simply isn't enough time available to develop all the required functionality from scratch and, at the same time, meet new product deadlines.

Because of this shift, the embedded industry is undergoing a sea change in its approach to development. Where previous generations of embedded developers were required to write unique operating systems and application code from scratch for each specific device, developers are now increasingly opting to use – and reuse – COTS software to build their embedded devices.

The benefits of standardization

Many reasons explain why this shift is happening now. First, during the past few years, embedded device developers have begun standardizing platforms based on open standards such as POSIX and open source software such as Linux. Just as many factors influence the choice between commercial or open source products, many benefits can result from standardization, including performance gains, faster time to market, and lower development costs.

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By standardizing a commercial or open source platform, developers can streamline the code writing process by reusing core software that doesn't change from device to device, freeing development teams to focus on the elements that differentiate their product. In addition to allowing developers to concentrate on the key elements of their device, using COTS software based on open standards speeds the development process and gets new devices to market faster.

Linux as a foundation for embedded systems

A key enabler of this trend toward software reuse lies in the growing ecosystem of both embedded software and applications for Linux. As embedded software gets too complex to build everything in-house, developers are relying on third-party or open source software to keep the development process efficient. In the case of Linux, using open source software also alleviates some of the problems traditionally encountered when running applications over different embedded hardware platforms, much as it has done in the enterprise software market. The growing use of Eclipse, an open source development framework that provides enterprise-strength tools for embedded developers, supports the adoption of Linux in embedded devices.

A final factor influencing the trend toward reusing software is the increasing "openness" of today's embedded devices. More and more, suppliers and sometimes even end users demand the ability to customize device functionality by downloading updates or other software pieces. For obvious reasons, it is more efficient to do this for a device built on an open standard platform. In the case of mobile phones, for example, network providers like to customize the handsets to support value-added services they provide and to differentiate the look and feel from other providers. Furthermore, end users are increasingly downloading additional applications available on the Internet. Similar trends are expected in the case of automotive infotainment systems and TV set-top boxes.

More innovation ahead

The growing availability of reusable software code for embedded systems and developers' increasing willingness to use it is prompting a rapid shift in the embedded industry. By removing the chore of writing time-consuming infrastructure code, these COTS software packages are setting the stage for a new wave of innovation in the embedded industry. ECD

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