Open systems require software APIs

Q & A with Steve Blackman, Director of Business Development, LynuxWorks, Inc.

EDITOR'S FOREWORD

I've known Steve Blackman for many years, throughout his career working for software companies while focusing on the military market. A sought-after panelist and speaker at defense conferences, Steve is one of the foremost authorities on operating systems used in military programs. Now at LynuxWorks, Steve is a driving force behind the company's rapid march into security-based products. – Chris Ciufo

MIL EMBEDDED: ***Please define the term*** **COTS.**

BLACKMAN: *COTS* [Commercial-Off-The-Shelf] means a hardware or software product that's ready-made and available for sale to the general public. They are often used as alternatives to in-house developments or one-off government-funded developments called *Government-Off-The-Shelf* or *GOTS*. Definitions vary, but here's the one I use:

- There's a part number for purchasing.
- The product is maintained by the vendor in its normal course of business (not NRE- based), and it's supported and has documentation.
- It has more than one customer using it, and there are competitors for the product.
- It's typically used as-is or with minor modifications.

MIL EMBEDDED: ***From the military's perspective, what are the top three advantages of using COTS?***

BLACKMAN: The biggest advantage is that product development is not paid for by the military, and there are no NRE costs. Second, there are no ongoing costs. Finally, reliability is enhanced because the product is proven by use with many users.

MIL EMBEDDED: ***What is the impact of Linux on the industry? How about on the DoD?***

BLACKMAN: Linux has changed the industry dramatically by providing a viable alternative to proprietary operating systems. Business models are being forced to change – vendors are increasingly pressed to eliminate runtime royalty fees; some now sell a bundled project license instead. Since Linux is *free*, vendors are hard-pressed to find a profitable OS business model.

Some of the pioneers in the embedded Linux market such as Lineo, TimeSys, and MontaVista have either fallen by the wayside or are very visibly struggling to grow. OS vendors will add special niche capabilities to provide value to customers and evolve products such as middleware or tools to maintain profitability. Continued investment in generic OSs will decrease as Linux becomes a standard.

The good, the bad, and the ugly?

The good: Utilization of COTS technology continues to help the defense budget.

The bad: Procurements that require COTS and open systems but ignore it in implementation.

The ugly: Procurements that require COTS and open systems, ignore it in implementation, *and claim to be open.*
– Steve Blackman

As far as the military is concerned, while some vendors have raised GPL [General Public License] and security flags to scare away customers, the government in general, and the DoD specifically, has embraced Linux. Security aspects are starting to be addressed, and performance requirements of many military systems are sufficiently low that Linux can and is being specified in many military programs.

MIL EMBEDDED: ***Can you comment on program life-cycles from a software standpoint?***

BLACKMAN: To utilize commercial technology over a long life cycle, the architecture of the system must be designed to allow COTS components to be swapped out easily with newer versions and/or with newer technologies. From a software perspective, the

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change is typically harder than with hardware. Adherence to open systems APIs allow newer tech-nologies to be more easily inserted – such as swapping out OS A for OS B. Most software systems in the past failed to utilize open standards because it's in the best interest of the vendor and integrator to create lock-in technology.

MIL EMBEDDED: ***Early on, there were dire predictions of doom and disaster if COTS was used by the military. Did any problems actually occur?***

BLACKMAN: Utilizing the Intel 960 on the F-22 was a problem because the processor was discontinued before the jet fighter was completed. The programs reached DMS (Diminished Manufacturing State) before the development was com-pleted. A lifetime buy was not viable. Processor and software changes were required, adding to costs/schedule delays.

MIL EMBEDDED: ***What kinds of systems don't or won't use COTS? Why?***

BLACKMAN: Typically, programs with high information assurance requirements avoid certain COTS components. The NSA may not want wide availability of the technology they are utilizing (such as encryption chips).

Also, programs where the technology does not yet exist are typically funded by the government and forgo COTS. An example is Software-Defined Radio [SDR]. When JTRS [Joint Tactical Radio System] started, each prime that was awarded a contract wrote their own Software Communications Architecture [SCA] framework rather than fund the commercial industry to develop a frame-work. This has hampered the growth of COTS SCA products in the market because the primes already have in-house products which are funded by the government. At the same time, software developers are reluctant to invest in development of an SCA framework if their potential customers already have in-house solutions.

MIL EMBEDDED: ***At one time vendors had to argue against NDI [Non-Developmental Items], then argue in favor of open standards, then finally argue in favor of COTS. Do you ever fight these battles anymore? What's changed?***

BLACKMAN: I still see leading incum-bent vendors avoiding open standards in the software industry. The only change comes when they lose business and are forced to provide the solution, as seen in the Navy's Open Architecture Computing Environment, which mandated POSIX 54. The leading embedded vendor only agreed to add the API for POSIX 54 after they'd seen significant business go away.

I also still see incumbent vendors and primes avoiding open standards after they are awarded the program. Apparently the military program offices do not fully understand what open systems is about and believe a modular interface will suffice. The result is a proprietary-based system that continues to be developed and fielded, adding significant cost to the DoD ($17 billion last year).

MIL EMBEDDED: ***Do you think the military will ever move backwards, away from COTS?***

BLACKMAN: No, COTS will be here for a long time and is driven by cost advantages.

Steve Blackman *is director of business development, mil/aero for LynuxWorks, Inc. With more than 25 years of relevant industry and technology experience in the embedded industry, Steve has managed sales and marketing organizations, selling both hardware and software to the commercial and defense communities addressing applications from networking to safety-critical avionics to security.*

LynuxWorks (www.lnxw.com) is a leading provider to the defense community of embedded operating systems and tool suites that are based on open standards – POSIX, JTA, Navy OACE, Linux LSB, ARINC 653, MILS, and Eclipse. The company's products are uniquely positioned to provide Linux compatibilities with hard, real-time performance, and they address numerous applications from weapons systems and C4ISR to safety-critical avionics and Common Criteria security.