



LEONARDO MAINTAINS TECHNOLOGICAL ADVANTAGE WITH WIND RIVER

VxWorks powers state-of-the-art safety-related radio frequency system on multi-core processor architectures

Leonardo is a global security company with technological capabilities across aerospace, defense, and security domains. One of the largest aerospace and defense companies in the UK, Leonardo invests in innovation within industry, academia, and government in capabilities including data and artificial intelligence, sensing and protection, electronic warfare, future aviation, uncrewed systems, and space.

THE CHALLENGE

Many electronic systems deployed in aerospace and defense systems have in-service lifetimes lasting decades, but the software “under the hood” requires regular updating. This enables users to respond to new and emerging threats and exploit the latest technologies and capabilities. Recent widespread commercial availability of multi-core processor architectures has provided significant opportunities for increasing performance through use of midlife updates and next-generation platforms. Leonardo is investing in these state-of-the-art multi-core processor architectures for its radio frequency (RF) systems, selecting best-in-class designs for specific functions and, utilizing them to mitigate against future hardware obsolescence. Leonardo also wants to deploy software-defined capabilities to enable rapid updates during in-service lifetimes.

In parallel, there has been an increase in safety regulations in civil and defense sectors for electronic systems, including hardware and software. Some mature processor designs have safety certification and boast long in-service history, but new processor designs can present a program risk until they have an established track record.



Industry

Aerospace & Defense
and Security

Solution Used

- VxWorks Cert Edition
- Wind River Professional Services for BSPs, device drivers, and DO-178C safety certification

Benefits

- Deterministic real-time performance
- Broad processor architecture support
- Abstraction to mitigate hardware obsolescence
- Proven safety certification track record and reduction of certification risk

THE APPROACH

To address the challenge of using different multi-core processor architectures for individual system functions within the Leonardo RF system, the company is using the VxWorks® real-time operating system (RTOS) from Wind River® to provide a common application runtime environment across processor architectures. Leonardo is developing applications that use VxWorks APIs as part of the VxWorks Cert Edition RTP API subset, enabling applications to run on both commercial-grade VxWorks and safety-critical VxWorks Cert Edition runtime environments.

VxWorks includes low-level hardware support and optimizations for each individual processor architecture while providing an abstract, high-level application programming interface (API) that can be utilized by Leonardo applications and minimizing the amount of architecture-dependent code. These applications can be ported to new processor architectures with ease. VxWorks also provides flexible support for single-core and multi-core support on different architectures, enabling configuration of individual systems based on application performance requirements and safety certification requirements.

VxWorks is also the first commercial RTOS to support OCI containers, which have been defined as part of the Open Container Initiative. The OCI container implementation in VxWorks uses a lightweight minimal footprint combined with VxWorks real-time processes (RTPs). This enables the development of containerized applications on VxWorks to rapidly deploy new software-defined capabilities.

Wind River's Professional Services organization is also supporting Leonardo with functional cert board support packages (BSPs) so that VxWorks can run on specific target hardware, and with device drivers for high-performance networking communications.

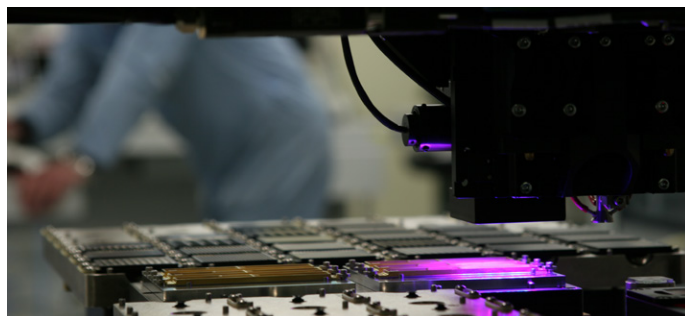
Wind River Professional Services is also developing DO-178C certification evidence packages for BSPs on each multi-core processor architecture for Leonardo, to support formal safety certification of the systems using these processor architectures. Wind River has more than 30 years of safety experience, with a proven track record of safety certification on multiple processor architectures to meet different safety standards and involving different certification authorities. This expertise and experience help Leonardo reduce certification risk.

THE RESULT

Wind River has ported VxWorks Cert Edition to each of the selected best-in-class multi-core processors. The RTOS supports symmetric multiprocessing (SMP) on each architecture, providing scalable and deterministic hard real-time performance. Wind River has delivered BSPs for the hardware reference platforms along with device drivers for the latest-generation Ethernet interfaces, enabling deterministic and low-latency networking performance.

Leonardo is now using these deliverables in its RF system. The company has successfully developed applications that run on VxWorks on the multi-core processor architectures, and it has commenced system integration.

Wind River has started development of DO-178C DAL C certification evidence packages and is working closely with Leonardo to support certification review and audit processes and reduce risk.



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