Wind River Helix
Virtualization Platform

Embedded solution development is significantly more complex today than it once was. This change is fueled by the demand for more intelligence at the edge with a path toward autonomous systems, the need to evolve and modernize legacy systems while simultaneously supporting existing applications, the cost and effort of supporting mandated safety regulations, and the urgency of keeping pace with innovation. In response to these challenges, software architects and developers need to adopt modern software best practices, such as DevOps and new frameworks, and introduce cloud deployment strategies, including virtualization and application consolidation, to embedded system design. These practices enable design flexibility, accelerated development, greater scope of applications, and efficient manageability.

Wind River® Helix™ Virtualization Platform is a safety certifiable, multi-core, multi-tenant platform for mixed levels of criticality. It consolidates multi-OS and mixed-criticality applications onto a single edge compute software platform, simplifying, securing, and future-proofing designs in the aerospace, defense, industrial, automotive, and medical markets. It delivers a proven, trusted environment that enables adoption of new software practices with a solid yet flexible foundation of known and reliable technologies on which the latest innovations can be built. The platform provides various options for your critical infrastructure development needs, from highly dynamic environments without certification requirements to highly regulated static applications such as avionics and industrial. It is also designed for systems requiring the mixing of safety-certified applications with noncertified ones, such as automotive. Helix Platform gives you flexibility of choice for your requirements today, and adaptability for your requirements in the future.
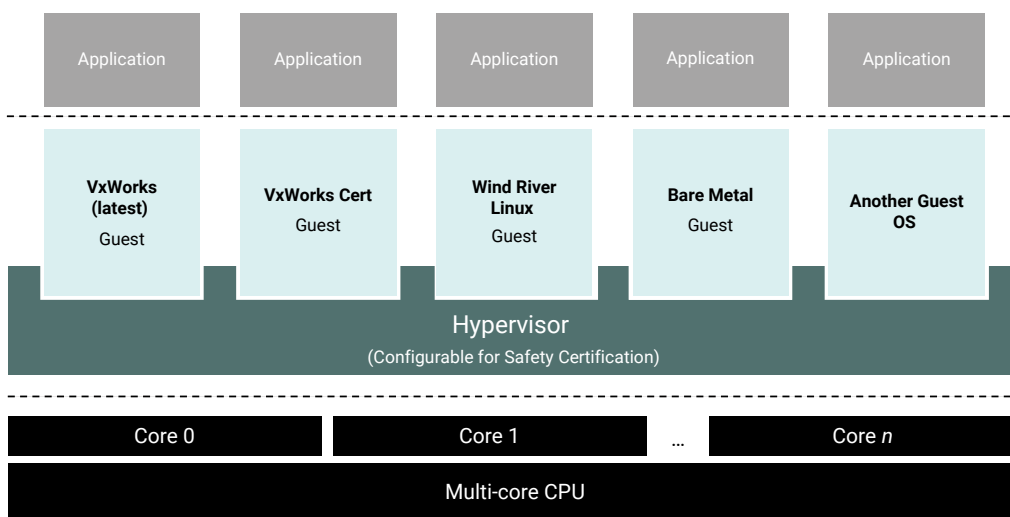

Figure 1. Wind River Helix Virtualization Platform architecture

KEY BENEFITS

- **Delivers proven market excellence:** Helix Platform includes VxWorks®, which has a rich pedigree of single and multi-core development and has been proven in more than 2 billion devices worldwide. The RTOS is trusted by over 9,000 companies and has been chosen to go to Mars with NASA for nearly three decades, including in the 2020 Perseverance rover.

- **Speeds and eases certification:** In its history of more than 40 years, Wind River has built an extensive portfolio of safety certification experience, with more than 600 programs in more than 100 civilian and military aircraft and more than 360 customers using the VxWorks safety platform. VxWorks has been certified to meet both ISO 26262 automotive safety and IEC 61508 industrial functional safety requirement standards.

- **Reduces total cost of ownership:** Helix Platform has been designed for simplified certification of safety-critical applications according to the stringent requirements of the DO-178C Software Considerations in Airborne Systems, IEC 61508 industrial functional safety, and ISO 26262 automotive safety standards. In addition, its modular, open architecture employs robust partitioning that dramatically reduces retesting and recertification of an entire platform when a change is made to one of the partitions. This reduces the total cost of ownership (TCO). New partitions can easily be added to any device without the typical retesting requirements of an entire system.

- **Provides flexibility:** Helix Platform enables development and deployment of dynamically configured systems running applications, such as machine learning and analytics. It also enables mixed-criticality systems with safety-certified and general-purpose application requirements. Helix Platform allows these applications to coexist on a single platform and collaborate and communicate while ensuring their independent domains.

- **Lowers cost of application development and deployment:** Helix Platform supports an open, standards-based device virtualization framework that efficiently enables third-party operating systems without the overhead of emulation. Additional benefits include:

  - Support for independent build, link, and load (IBLL), allowing independent, asynchronous development, test, and delivery of software applications per the RTCA DO-297 integrated modular avionics (IMA) standard
  - Reduced software bill of materials (SBOM) through application consolidation

- **Eases scalability and portability:** The Helix Platform hypervisor is OS-agnostic: It supports any operating system — unmodified — inside a virtual machine. Support for unmodified guest OSes eases portability for legacy applications mixed with modern applications and operating systems. Built-in guest OS support includes VxWorks (the latest edition), VxWorks Cert, Wind River Linux, bare metal, and other operating systems through Wind River Professional Services. Helix Platform supports advanced separation technology, allowing legacy code reuse and the ability to utilize open source for flexibility.

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- **Increases safety, security, and robustness:** Because the Helix Platform multi-core scheduler uses hardware virtualization technology, it enables deployment of mixed-criticality, unmodified guest operating systems. This allows safe and non-safe applications to run in parallel on separate cores, increasing safety, security, and robustness. This enables high portability across product lines, ultimately lowering upgrade costs by allowing simultaneous support for airborne platforms such as ARINC 653 APEX API, POSIX®, and FACE™.

- **Provides high performance and determinism:** Helix Platform is high performance and deterministic for the most demanding embedded, real-time applications. The Wind River Type 1 hypervisor provides full control over how the hardware is configured. It allows for high-performance compute cycles and low-overhead I/O access, using the hardware virtualization accelerators available in today's processors. In addition, it has a minimal footprint that is primarily designed to configure the hardware and delivers high throughput and low latency inter-process communication (IPC).

- **Accelerates innovation of new solutions:** Helix Platform uses standard workflows as part of Wind River Studio, to develop (configure, build, code, and debug) in a heterogeneous virtualization environment that can include:
  - Safety-critical applications using a configuration model driven by statically defined XML
  - Safety-critical applications using the standard configuration model driven by dynamic user inputs

  Additionally, the platform includes Wind River Simics® support for system simulation and automation.

- **Provides support for a broad range of architectures and CPUs:** Helix Platform provides multi-core hardware support and availability on the latest Arm® and Intel® architectures, as well as CPUs from Intel, NXP, and Xilinx that enable both 32- and 64-bit guest OSes.

DEVELOP, DEPLOY, AND OPERATE ACROSS THE INTELLIGENT EDGE

Wind River Studio

Wind River Studio is the first cloud-native platform for the development, deployment, operations, and servicing of mission-critical intelligent edge systems that require security, safety, and reliability. It is architected to deliver digital scale across the full lifecycle through a single pane of glass to accelerate transformative business outcomes.

As part of Studio, Helix Platform enables intellectual property and security separation between the platform supplier, the application supplier, and the system integrator. This separation provides a framework for multiple suppliers to deliver components to a safety-critical platform.

Wind River Simics

Simics simulates systems from the smallest to the most complex, so developers can adopt new development techniques that are not possible with physical hardware. Simics allows teams to move faster and improve quality, easily bringing agile and DevOps software practices to embedded development. For more information, visit www.windriver.com/products/simics.

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WIND RIVER PROFESSIONAL SERVICES

The CMMI Level 3–rated Wind River Professional Services organization leverages years of system design and development expertise to work collaboratively with customer design and program teams. Professional Services interprets system requirements; architects platform options; and provides recommendations for meeting business, technical, and program goals. The Professional Services team also has a safety-critical services practice that can deliver safety certification evidence for additional software components, including certified board support packages (BSPs), middleware, and application software.

For more information, visit www.windriver.com/services.

WIND RIVER EDUCATION SERVICES

Wind River offers instructor-led, on-demand, and mentored learning, including our anytime, anywhere access to online subscription-based e-learning. For more information, visit www.windriver.com/education.

WIND RIVER CUSTOMER SUPPORT

Helix Platform is backed by the Wind River award-winning global support organization. We offer live help in multiple time zones, the online Wind River Support Network with multifaceted self-help options, and optional premium services to provide the fastest possible time-to-resolution.

For more information, visit www.windriver.com/services/customer-support.

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