WIND RIVER HELIX VIRTUALIZATION PLATFORM FOR AUTOMOTIVE

After significant investment, carmakers have demonstrated, one by one, that they can produce next-generation vehicles that are autonomous, connected, and electric. So why aren't they on the streets? An important obstacle must be solved before these cars can be mass-marketed: They require an enormous amount of compute power, resulting in an array of IT servers and graphics processing units that can occupy the entire trunk of the vehicle. The necessary safety certification and the complexities involved in attaining it are in conflict with the sheer size and scope of technologies being utilized. What is the most efficient way to meet these challenges while avoiding integration issues and massive new testing efforts—yet also ensuring redundancy to guard against failures?

Wind River® Helix™ Virtualization Platform consolidates multi-OS and mixed-criticality applications onto a single edge compute software platform, simplifying, securing, and future-proofing designs in the automotive market. This virtualization platform provides you with the ability to run safety-critical and general-purpose applications side by side. Whether you're most concerned with a real-time operating system (RTOS), Linux, safety, security, latency, determinism, criticality, or a combination of these, Helix Platform gives you the flexibility of choice, allowing you to consolidate all types of functions into a single platform, today and into the future.

FEATURES AND BENEFITS

- **Delivers proven market excellence:** Helix Platform is developed from and includes VxWorks®, the Wind River market-leading RTOS product line with a rich pedigree of single- and multi-core development, proven in more than 2 billion devices worldwide. VxWorks has been trusted by more than 9,000 companies and chosen as the RTOS to go to Mars with NASA for nearly 25 years, most recently in the 2018 InSight robotic lander.

- **Speeds and eases certification:** Over its nearly 40-year history, Wind River has developed an extensive portfolio of safety certification experience, with more than 550 safety certification programs in more than 90 civilian and military aircraft and more than 350 customers using the VxWorks safety platform. VxWorks has also been certified to meet ISO 26262 automotive functional safety requirements.

- **Supports high portability with OS-agnostic virtualization and separation technology:** The Helix Platform hypervisor is OS-agnostic, which means it provides the capability of running any OS, unmodified, inside a virtual machine. Support for unmodified guest OSes eases portability for legacy applications mixed with modern applications and OSes. Guest OS support includes the leading embedded RTOS, VxWorks; the leading commercial embedded Linux OS, Wind River Linux (and other Linux distributions); Ubuntu; ROS; and other OSes. Helix Platform also

supports advanced separation technology, allowing legacy code reuse and the ability to use open source for flexibility.

- **Enables mixed-criticality support:** Because the Helix Platform multi-core scheduler uses hardware virtualization technology, the platform enables virtualization of mixed-criticality unmodified guest OSes. This allows your safe and non-safe applications to run in parallel on separate cores, increasing safety, security, and robustness (see Figure 1). Additional benefits include:
  - Reduced bill of materials (BOM) through application consolidation
  - High performance and low jitter

- **Supports industry standards conformance:** Helix Platform supports an open, standards-based device virtualization framework that efficiently enables third-party OSes without the overhead of emulation. This lowers your upgrade costs by providing high portability across your product lines by allowing:
  - Simultaneous support for automotive platforms such as Linux, ROS, Ubuntu, and others
  - A virtualized operating environment along with our Adaptive AUTOSAR implementation, which removes low-level complexities surrounding handling and communication of services

- **Meets stringent requirements of safety certification and affordability:** Helix Platform has been designed to be certified and to simplify the certification of safety-critical applications according to the stringent requirements of the ISO 26262 automotive safety standards. In addition, its modular, open architecture employs robust partitioning that dramatically reduces the requirement to retest and recertify your entire platform when a change is made to one of the partitions, thus reducing your total cost of ownership (TCO). New partitions can easily be added to your device without the typical system-wide retesting requirement.

- **Supports 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.

- **Provides a rapid development environment:** Helix Platform uses standard workflows to configure, build, develop, and debug. It also allows development of products in a heterogeneous virtualization environment that can include safety-critical applications using a configuration model driven by statically defined XML, or applications using the standard configuration model driven by dynamic user inputs. Additional benefits include:
  - Wind River Workbench development suite based on the Eclipse open tool architecture, enabling wide integration of industry toolchains and the ability to connect to any software in the system to profile and debug it
  - Wind River Simics® support for system simulation and automation resulting in reduced hardware design cycles

- **Supports embedded real-time applications:** Helix Platform is high performance and deterministic for the most demanding embedded real-time applications. The Type 1 hypervisor virtualization layer provides full control over how the hardware is configured. It allows for high-performance compute cycles and low-overhead I/O access using the
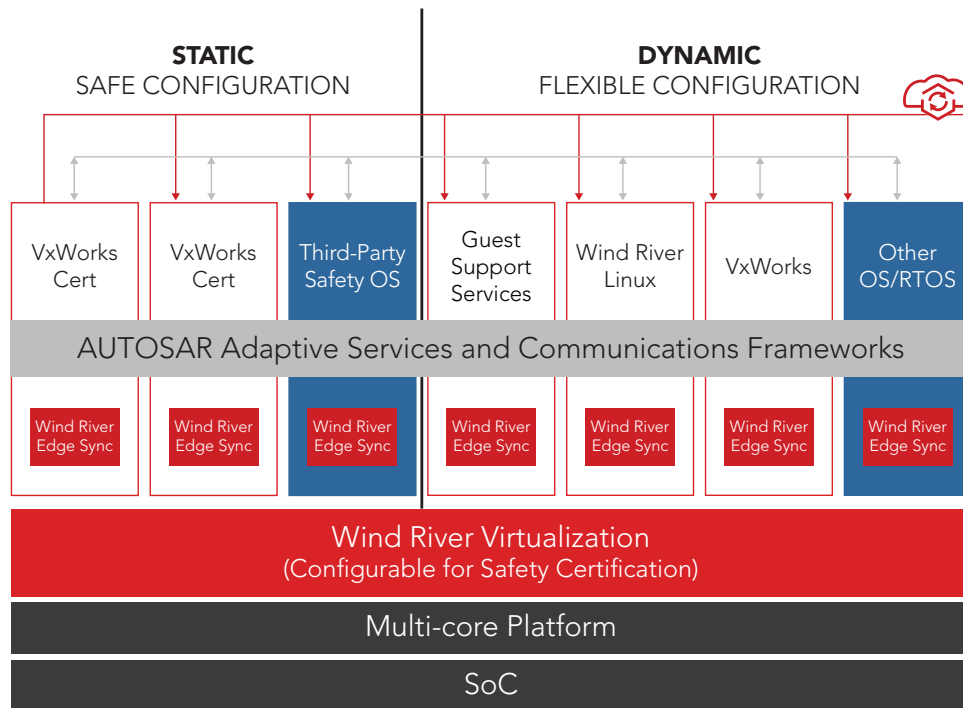
Figure 1. Wind River Helix Virtualization Platform architecture

hardware virtualization accelerators available in today's processors. In addition, it has a minimal footprint that is primarily designed to configure the hardware and has high throughput and low latency interprocess communication (IPC).

OPTIMIZED, INTEGRATED DEVELOPMENT SUITE

Wind River Workbench

Helix Platform includes Workbench, which offers best-in-class development and debugging tools along with cutting-edge system analysis tools for optimizing the Helix Platform environment. A fully integrated, Eclipse-based open development suite optimized to support design, development, test, and certification of applications, Workbench consists of a project facility to define application resources and an XML configuration tool to easily define the static configuration required for safety-critical applications.

Helix Platform also enables the intellectual property and security separation between the platform supplier, the application supplier, and the system integrator, providing a framework for multiple suppliers to deliver components to a safety-critical platform.

Wind River Simics

Simics enables software to run on virtual platforms just as it does on physical hardware. Along with its capabilities for scripting, debugging, inspection, and fault injection, Simics enables you to define, develop, and integrate your systems without the constraints of physical target hardware. Simics provides you the access, automation, and collaboration

required to enable agile and continuous development practices. Simics helps to reduce hardware design cycles and to accelerate time-to-market.

WIND RIVER PROFESSIONAL SERVICES

Our CMMI Level 3–rated services organization offers a specialized Safety Critical Services Practice that can deliver safety certification evidence for additional software components. Our services team of engineers has extensive experience delivering design, integration, and optimization services tailored to the needs of your industry and is fully equipped to provide professional certification services at any level, including certified board support packages (BSPs), middleware, and application software.

We have more than 400 dedicated automotive engineers in worldwide design centers that offer local support and distributed development teams. Our expertise has helped our OEM and Tier 1 customers achieve driver safety and optimize human–machine interface (HMI) usage, software and infrastructure security and connectivity, location-based services, mobile device synchronization, and data analytics. We are proud to deliver more than 200 automotive projects annually. For more information, visit www.windriver.com/services.

WIND RIVER EDUCATION SERVICES

Wind River offers technical, hands-on training, mentoring, and on-demand learning. For more information, visit www.windriver.com/education.

WIND RIVER CUSTOMER SUPPORT

Helix Platform is backed by our 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 you the fastest possible time-to-resolution. For more information, visit www.windriver.com/support.

HOW TO PURCHASE

Visit www.windriver.com/company/contact to find your local Wind River sales contact. To have a representative contact you, call +1-800-545-9463 or write to salesinquiry@windriver.com.