

## Wind River Hypervisor

Virtualization for embedded systems is a significant industry trend that opens up new opportunities for companies building next-generation single and multicore devices. Device makers can utilize Wind River Hypervisor to consolidate their systems by replacing multiple boards or CPUs with a single board and/or a single CPU. They can use multiple operating systems (such as an RTOS and a general purpose OS) cooperatively to provide innovative device functionality and adopt multicore processors with improved scalability and reliability. The effective adoption and optimization of virtualization and multicore will be key differentiating factors in the competitive marketplace for next-generation devices.

Wind River Hypervisor is one of the building blocks of Wind River’s comprehensive Multicore Software Solution. The Wind River Hypervisor is optimally integrated (for performance) with Wind River Linux and VxWorks and has the ability to support other operating systems and executives. Wind River Hypervisor provides new software configurations required to architect the embedded systems of tomorrow—systems that can be developed, diagnosed, and analyzed using Wind River Workbench.

Wind River Hypervisor provides virtualization capabilities that enable the configuration of single and multicore processors with multiple operating systems.

### Product Highlights

Wind River Hypervisor is a type 1 embedded hypervisor with a very small footprint, minimal latency for device access, plus deterministic capabilities and optimizations for maximum performance. Wind River Hypervisor supports a variety of different processor architectures, taking advantage of hardware virtualization support when applicable.

The Hypervisor provides the ability to configure and partition hardware devices, memory, and cores into “virtual boards” that an operating system uses as its execution environment. The Hypervisor provides the ability to run multiple different virtual boards on a single processor core (core virtualization) or one virtual board per processor core (supervised AMP). In both cases, the Hypervisor can be used to provide virtualization and protection of memory and device access.

Wind River Hypervisor is configurable. It can be configured to use all of its features, including core virtualization; or it can be scaled down to a minimal “supervisor,” to provide improved protection, reliability, and scalability in a supervised AMP (sAMP) configuration.

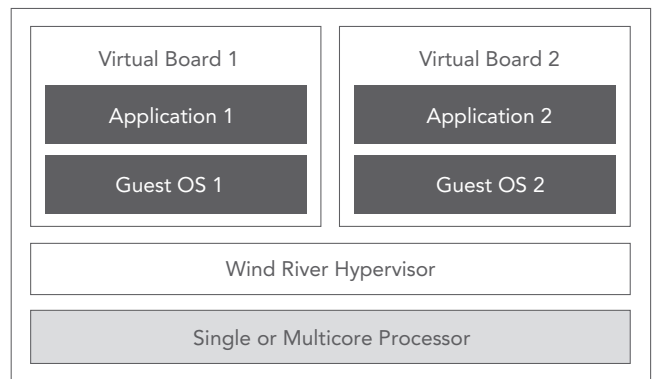


Figure 1: Virtualized system

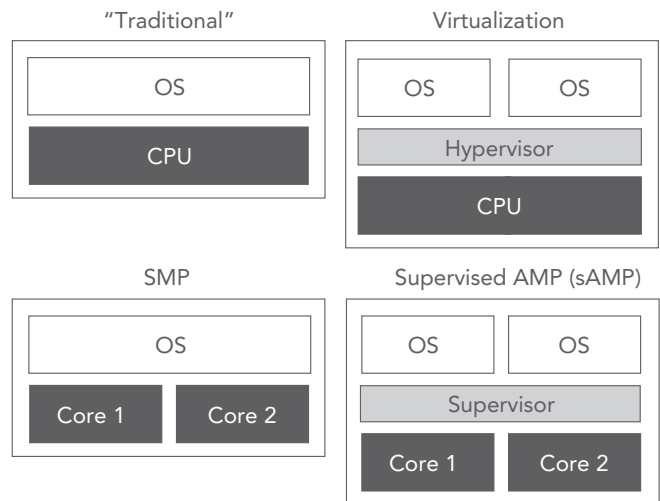


Figure 2: Multicore software configurations

## Benefits

### Consolidation

Systems that require multiple processors or computers are expensive, in terms of hardware costs and power consumption. The Wind River Hypervisor offers the opportunity to consolidate existing systems to a single or multicore system, which reduces both cost of goods sold (less hardware required) and operating costs (reduced power consumption, fewer spares in the field).

### Innovation and Differentiation

Existing devices may use a legacy operating system or be constrained to one operating system that may make innovation more challenging. The Hypervisor allows multiple operating systems to coexist and safely cooperate on the same device, enabling the introduction of a new operating system or newer operating system versions while leveraging existing software assets.

### Effective and Scalable Adoption of Multicore

Multicore processors promise increased performance and reduced power consumption; however, adapting software developed for a single-core processor to run on multicore processors in a reliable and scalable manner is difficult. SMP systems may not scale adequately and are intrinsically restricted to running a single operating system. Manually created AMP systems are complex and difficult to configure, especially as the number of cores increases. Using Wind River Hypervisor to support a supervised AMP configuration makes systems easier to configure, provides increased protection between cores, reduces complexity, and provides a more scalable solution.

### Flexibility to Support Multiple Scenarios

Multicore is a big change for many software development teams. Wind River Hypervisor is part of Wind River's larger multicore software offering, which includes multicore-ready operating systems, virtualization layers, middleware, and tooling. The breadth of Wind River's offering provides the ability to support different multicore configurations. For example, this allows a development team to start with a VxWorks SMP configuration and then move to Hypervisor and add Linux later. This could be used as a planned migration to multicore or for different variations of product lines.

### Features

- **Processors:** Supports single and multicore processors
- **Operating systems:** Integrates with VxWorks and Wind River Linux for optimal performance; supports other operating systems and executives
- **Virtual board interface:** Provides a hardwarelike interface for easy porting of operating systems or for developing minimal applications that do not require an operating system
- **Protection:** Enables assigning devices to virtual boards; provides device and memory protection between the virtual boards; failures in the applications or operating system on one virtual board do not affect another operating system and its applications

- **Configuration:** Uses convenient XML-based system configuration; configuration changes do not require rebuilding guest operating systems or applications
- **Build:** Provides system projects for building entire multi-OS systems from Wind River Workbench
- **Debugging:** Features agent-based debugging of VxWorks and Linux applications over serial and Ethernet connections, and supports JTAG-based debugging, which facilitates debugging of multiple collaborating cores on a multicore chip
- **Core scheduling:** Provides a priority-based scheduler; partitioned and other schedulers can be supported
- **Communication:** Provides a message-passing protocol designed for communication between cores and/or virtual boards; uses a socketlike API and shared memory as a fast, zero-copy communications medium between OSes
- **Device access:** Provides direct access to devices from virtual boards, thereby minimizing overhead, and provides the ability to share devices (e.g., serial, Ethernet) so a single device can be used by more than one virtual board
- **Virtual board management:** Enables start, stop, and reload/restart of guest operating systems

### Operating System Support

- VxWorks
- Wind River Linux
- Other operating systems in progress and available upon request

Note that applications can run without an operating system using the virtual board interface.

### Architecture Support

The Wind River Hypervisor has been developed to support many embedded processor architectures and currently supports the following:

- Intel Architecture
- PowerPC
- Other architectures in progress and available upon request

### Related Products

- Wind River VxWorks MILS Platform, for Common Criteria certification requirements or to integrate multiple levels of security on a device, provides the foundation for multilevel secure (MLS) solutions, with virtualization of guest operating systems using the Wind River Hypervisor technology.
- Wind River ICE 2 provides true multicore debugging.

### Education and Support Services

- Wind River Hypervisor training course
- Hypervisor Rapid Integration Mentoring
- Wind River Professional Services to customize Hypervisor or integrate other operating systems

### How to Purchase Wind River Solutions

Visit [www.windriver.com/company/contact-us/index.html](http://www.windriver.com/company/contact-us/index.html) to find your local Wind River sales contact. To have a sales representative contact you, call 800-545-9463 or write to [inquiries@windriver.com](mailto:inquiries@windriver.com).

**WIND RIVER**

Wind River is the global leader in Device Software Optimization (DSO). We enable companies to develop, run, and manage device software faster, better, at lower cost, and more reliably. [www.windriver.com](http://www.windriver.com)

© 2010 Wind River Systems, Inc. The Wind River logo is a trademark of Wind River Systems, Inc., and Wind River and VxWorks are registered trademarks of Wind River Systems, Inc. Other marks used herein are the property of their respective owners. For more information, see [www.windriver.com/company/terms/trademark.html](http://www.windriver.com/company/terms/trademark.html). Rev. 02/2010