WIND RIVER HYPERVERSISOR ESSENTIALS

COURSE DESCRIPTION
The Wind River® Hypervisor Essentials course provides engineers with a fast, cost-effective way to acquire the skills necessary to use Wind River Hypervisor and develop multi-OS, secure and safe systems.

After this course, participants will be able to perform the following:

• Design, implement, optimize, and debug Wind River Hypervisor–based systems featuring various combinations of guest operating systems
• Design safe and secure systems with Wind River Hypervisor Safety Profile
• Configure Wind River Linux, VxWorks®, VxWorks Cert, Windows, and Red Hat operating systems to run in a virtualized environment with efficient inter-guest communication
• Bring up multiple operating systems on Intel®, Freescale, and ARM architectures
• Design systems that share resources, exchange data, synchronize tasks running on different partitions, and mix different levels of criticality

PRODUCTS SUPPORTED
• Wind River Hypervisor 2.0
• VxWorks 6.9
• VxWorks Cert 6.6.4
• Wind River Linux 4.3
• Wind River Simics 4.6

COURSE FORMAT
• This three-day expert-led course consists of lectures and lab sessions.
• Attendees use Wind River Hypervisor, VxWorks, VxWorks Cert, Wind River Linux, and Simics to gain experience with the topics presented.

Course title: Wind River Hypervisor Essentials
Duration: Three days
Format: Instructor-led lectures and hands-on lab sessions; instructor-led Live Remote delivery available
Content:
Day 1: Introduction to Virtualization; Wind River Hypervisor; Configuring a VxWorks Guest
Day 2: Configuring a Linux Guest; Configuring Wind River Hypervisor; SMP Guests on Wind River Hypervisor; Configuring an Unmodified Guest; Inter-guest OS Communication; Inter-guest OS Communication Programming API
Day 3: Sharing a Serial Port Between Guests; Configuring a VxWorks Cert Guest; Safety Profile; Wind River Hypervisor Shared Memory Networking; Managing Guests; Hypervisor Performance; Wind River Hypervisor for Intel Architecture; Wind River Hypervisor for ARM Architecture

• Participants examine and exercise simulated network topologies in hands-on labs.
• Participants receive individual guidance from an expert engineer who has extensive experience with Wind River technologies

AUDIENCE
• Application engineers
• System integrators and architects
SYLLABUS

Day 1

INTRODUCTION TO VIRTUALIZATION
(An optional prelude lecture for engineers who have not been exposed to multi-core embedded virtualization)
- What is virtualization?
- History of virtualization
- Advantages of virtualization
- Why multi-core loves virtualization
- Device market requirements for virtualization

WIND RIVER HYPervisor
- Architectural design
- Platform variants
- Contexts, threads, and virtual boards
- Basic interfaces and capabilities
- Booting
- LAB: Wind River Hypervisor hello world

CONFIGURING A VXWORKS GUEST
- Workbench projects
- XML configuration
- LAB: Building a VxWorks guest

Day 2

CONFIGURING A LINUX GUEST
- Linux guest platform project
- XML configuration
- Device trees
- LAB: Building a Wind River Linux guest

CONFIGURING WIND RIVER HYPervisor
- Workbench Hypervisor integration project
- XML configuration
- Hypervisor device types
- LAB: Building the Hypervisor

SMP GUESTS ON WIND RIVER HYPervisor
- Introduction
- Configuring SMP guests

CONFIGURING AN UNMODIFIED GUEST
- Windows
- Red Hat
- VxWorks

INTER-GUEST OS COMMUNICATION
- Introduction to MIPC
- MIPC configuration and capabilities

INTER-GUEST OS COMMUNICATION PROGRAMMING API
- Introduction
- AF_MIPC
- Kernel API
- Examples
- LAB: Configuring a virtual board application (VBA) and MIPC
- LAB: Debugging Linux and VxWorks guests

Day 3

SHARING A SERIAL PORT BETWEEN GUESTS
- Multiplexed virtual serial device

CONFIGURING A VXWORKS CERT GUEST
- Workbench projects
- XML configuration

SAFETY PROFILE
- Wind River Hypervisor profiles
- Safety Profile
- Frame scheduler
- Safe IPC
- LAB: Configuring a Cert-safe MIPC Hypervisor

WIND RIVER HYPervisor SHARED MEMORY
NETWORKING
- Virtual switch
- Safe IPC transport

MANAGING GUESTS
- Fault recovery
- Software upgrades
- Dynamic virtual boards
• LAB: Monitoring virtual boards
• LAB: Adding and using a custom manager

HYPERVERSOR PERFORMANCE
• Scheduling considerations
• Interrupt considerations

WIND RIVER HYPERVISOR FOR INTEL ARCHITECTURE
• Intel VT
• Intel VT-d
• MSI
• NUMA
• Intel 64-bit Hypervisor
• Shadow paging
• PCI

WIND RIVER HYPERVISOR FOR ARM ARCHITECTURE
• TrustZone
• Privileged guests
• Direct interrupts
• LAB: Adding a guest device driver

PREREQUISITE SKILLS
• One year of C programming
• Functional knowledge of UNIX
• Basic VxWorks API knowledge
• Real-time programming basics

PREREQUISITE COURSES
• Multi-core Technologies and Designing for Concurrency
• VxWorks 6.x and Workbench Essentials
• Wind River Linux and Workbench Essentials

RELATED COURSES
• VxWorks 6.x Asymmetric Multiprocessing
• VxWorks 6.x Symmetric Multiprocessing

GLOBAL REACH OF WIND RIVER EDUCATION SERVICES
With more than 30 years of device software experience, Wind River provides education services in every region of the world. Our private classes can be tailored to your needs by adding or removing topics from multiple courses. If you have more specific project challenges, Wind River Mentoring provides coaching by experienced engineers to help you integrate Wind River solutions into your environment. And when you’re too busy to attend a whole class, our On-Demand Learning options provide around-the-clock access to advanced and specialized topics. All of our education services are led by expert engineers who are closely connected to the Wind River technical community for access to specific expertise.

CONTACT US
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Wind River is a world leader in embedded and mobile software. Wind River has been pioneering computing inside embedded devices since 1981, and its technology is found in more than 1 billion products. Wind River is headquartered in Alameda, California, with offices in more than 20 countries. To learn more, visit Wind River at www.windriver.com.

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