WIND™

VXWORKS 7 SYMMETRIC MULTIPROCESSING

COURSE DESCRIPTION

The VxWorks® 7 Symmetric Multiprocessing course presents several methods to optimize application performance using parallel design techniques. Issues encountered in migrating applications to parallel design are discussed in detail. Specifics of creating and migrating applications to Wind River® VxWorks symmetric multiprocessing (SMP) technology are also addressed.

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

- Describe the multi-core processor architecture
- Distinguish between multi-core and multiprocessing environments
- Describe the VxWorks SMP system configuration
- Understand and solve pitfalls of serial programming in the SMP environment
- Migrate applications from the uniprocessor (UP) to the SMP environment
- Analyze concurrency using debugging tools
- Perform run-time analysis of applications in the UP vs. SMP environment

PRODUCTS SUPPORTED

- VxWorks 7
- Wind River Workbench 4
- Wind River Simics 4.8

COURSE FORMAT

- This two-day expert-led course consists of nine lectures and seven lab sessions.
- Attendees use VxWorks 7, Workbench 4, and Simics 4.8 to gain experience with the topics presented.
- Participants receive individual guidance from an expert engineer who has extensive experience with Wind River technologies.

Course title:	**VxWorks 7 Symmetric Multiprocessing**
Duration:	Two days
Format:	Instructor-led lectures and hands-on lab sessions; instructor-led Live Remote delivery available
Content:	**Day 1:** Introduction to SMP; VxWorks SMP Architecture; VxWorks SMP Configuration; VxWorks SMP Programming
	Day 2: Debugging and Analysis Tools; Introduction to Software Parallelism; Uniprocessor to SMP Migration; VxWorks SMP Scheduler

AUDIENCE

- Application engineers
- System integrators and architects

PREREQUISITE SKILLS

- C programming
- Functional knowledge of UNIX
- Basic VxWorks API knowledge
- Real-time programming basics

PREREQUISITE COURSES

- VxWorks 7 and Workbench Essentials

RELATED COURSES

- Multi-core Technologies and Designing for Concurrency
- VxWorks 7 Board Support Packages and Device Drivers

WHEN IT MATTERS, IT RUNS ON WIND RIVER

SYLLABUS

Day 1

INTRODUCTION TO SMP

- History of multi-core and multiprocessing
- Overview of SMP
- Other multi-core configurations
- Terminology
- **LAB: Getting Started with SMP**

VXWORKS SMP ARCHITECTURE

- Overview of SMP architecture
- Cache and cache coherency
- The sequential memory model
- Mutual exclusion
- Spinlocks and deadlocks
- Memory barriers
- Development challenges

VXWORKS SMP CONFIGURATION

- VxWorks SMP components
- Software and hardware requirements
- BSP
- **LAB: Configuring VxWorks for SMP**

VXWORKS SMP PROGRAMMING

- Spinlocks
- Read/write semaphores
- Task CPU affinity
- Interrupt CPU affinity
- Atomic operations
- Memory barriers
- POSIX thread barriers
- CPU information and management
- Uniprocessor incompatibilities
- **LAB: Synchronizing Data in an SMP Environment**
- **LAB: Synchronizing Data with Core Affinity and Core Reservation**
- **LAB: Synchronizing with Message Queues**
- **LAB: Synchronizing with Semaphores**

Day 2

DEBUGGING AND ANALYSIS TOOLS

- Multi-core debugging overview
- Breakpoints
- Multiple context debugging
- System viewer and analysis tools
- Kernel shell debugging
- **LAB: Working with Workbench Debugger**

INTRODUCTION TO SOFTWARE PARALLELISM

- SMP limits
- Parallel software design
- Implementing a parallel programming model
- Threading
- Parallelism examples
- Portable parallel programming APIs

UNIPROCESSOR TO SMP MIGRATION

- Migration guidelines
- The three-step migration plan
- Step 1: Update to current VxWorks version
- Step 2: Migrate to SMP API
- Step 3: Optimize for SMP
- **LAB: Comparing the Performance of Single Core and Multi-core Processors**

VXWORKS SMP SCHEDULER

- Overview
- VxWorks UP scheduler
- VxWorks SMP
- VxWorks SMP scheduler

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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