LINUX REAL-TIME ESSENTIALS USING PREEMPT_RT

COURSE DESCRIPTION

The Linux Real-Time Essentials Using PREEMPT_RT course provides engineers with a fast, cost-effective way to acquire the skills to develop and deploy real-time, efficient Linux-based platforms and applications by utilizing the Wind River® PREEMPT_RT Linux kernel. Attendees get an in-depth look at Linux internals, which affect real-time characteristics of the system, and will learn how to configure the real-time kernel and file system, develop real-time applications, and use various tools to evaluate the real-time characteristics.

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

- Develop and deploy real-time kernels and user space applications
- Analyze real-time characteristics and find causes for non-real-time behavior
- Understand Linux internals related to real-time
- Understand the PREEMPT_RT kernel configuration option

PRODUCTS SUPPORTED

- Linux kernel versions 2.6 and newer
- Yocto Project Linux
- Wind River Linux 9

COURSE FORMAT

- This one-day, expert-led add-on session consists of lectures and lab sessions.
- Attendees use the Wind River Linux development environment combined with actual hardware targets to gain experience with the topics presented.
- Participants receive individual guidance from an expert engineer who has extensive experience with Wind River technologies.
- This course is only available as an add-on session to augment other Wind River courses. It is not available as a standalone course.

AUDIENCE

- Kernel developers who want to understand Linux kernel internals, which affect system real-time behavior, or evaluate and optimize real-time characteristics of the system platform

Course title:	**Linux Real-Time Essentials Using PREEMPT_RT**
Duration:	One-day add-on to other Wind River courses
Format:	Instructor-led lectures and hands-on lab sessions
Content:	**Day 1:** Real-Time Fundamentals; Processes and Synchronization; Scheduling and Priorities; Internals of the Linux PREEMPT_RT Option; Developing Linux Real-Time Applications; Linux Real-Time Tools

- Application developers who want to develop efficient real-time applications and evaluate real-time characteristics of the developed application code

PREREQUISITE SKILLS

- Basic knowledge about the Linux operating system and Linux application or platform development

PREREQUISITE COURSES

- None

RELATED COURSES

- Wind River Linux CLI Essentials
- Wind River Linux Device Driver and Board Support Package Development

SYLLABUS

Day 1

REAL-TIME FUNDAMENTALS

- Real-time basics
- Latency and jitter
- Kernel preemption

WHEN IT MATTERS, IT RUNS ON WIND RIVER

PROCESSES AND SYNCHRONIZATION

- Linux processes and threads
- Atomic operators
- Memory fence
- Spinlocks
- Semaphores
- Mutexes
- Futexes
- CPU variables
- Read/write locks
- Read-copy update

SCHEDULING AND PRIORITIES

- Scheduling
- O(N) scheduler
- CFS scheduler
- Scheduling policies
- RT scheduling
- Process priorities

INTERNALS OF THE PREEMPT_RT OPTION

- Preemption modes
- The PREEMPT_RT patch
- Priority inversion and inheritance
- IRQ threads
- IRQ thread development guidelines

DEVELOPING LINUX REAL-TIME APPLICATIONS

- Real-time application development
- Memory management
- Thread management
- Scheduling management
- Application development guidelines

LINUX REAL-TIME TOOLS

- Latency measurement
- Overall system measurement
- System real-time fine-tuning
- System benchmarking
- System tracing
- **LAB: Configuring and Building a Wind River Linux Preemptable Kernel**

- **LAB: Optimizing Memory Access Performance in an Application**
- **LAB: Evaluating Wind River Linux Kernels with ftrace**
- **LAB: Evaluating a Real-time System with cyclictest**
- **LAB: Tuning the Platform for Real-Time Performance**
- **LAB: Manipulating Scheduling Policies and Priorities**

GLOBAL REACH OF WIND RIVER EDUCATION SERVICES

With more than 30 years of experience delivering software for intelligent systems, 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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