

FreeRTOS

in Theory and Practice



Training Description

To provide a practical knowledge and understanding of real-time kernel usage. What are the advantages? What are the trade-offs? Learn from an experienced trainer and take home a working knowledge of FreeRTOS and the ability to use it effectively in your own embedded development project.

This 3-day training class uses hands-on exercises combined with instruction to illustrate the concepts of a real-time kernel. Examples using FreeRTOS form a series of practical coding exercises designed to bring you quickly up to speed. The concepts and commands necessary to make effective use of FreeRTOS are described through a combination of theory and „hands-on“ training.

Target Group

software engineers, field engineers, (project) managers

Prerequisites

- Familiarity with embedded C concepts and programming
- Ability to develop software using C syntax
- Ability to use basic embedded compiler and debug tools
- Basic knowledge of embedded processor development boards

Training Content

- Introduction
 - FreeRTOS overview, market position, the „free“ in FreeRTOS, understanding the FreeRTOS license, software architecture, features.
 - LPCXpresso IDE download and installation, importing an example workspace.
- Task Management
 - Tasks - Creation, states, priorities, the idle task, deletion.
 - LPCXpresso Scheduling - Determinism, multitasking, endless loop, cyclic executives, issues with interrupts, non-preemptive, prioritized preemptive, rate monotonic, deadline, cooperative, hybrid.

- Queue Management
 - Creation, sending, receiving
- Interrupt Management
 - Deferred interrupt processing, interrupt handlers, interrupt safe functions, task with interrupt synchronization, efficient queue usage even from within an interrupt, interrupt nesting.
- Resource Management
 - Mutual exclusion, critical sections, suspending/locking the scheduler, mutexes, priority inversion, priority inheritance, deadlock, gatekeeper tasks.
- Memory Management
 - Resource constrained memory allocation schemes, determining the amount of free memory remaining.
- Trouble Shooting
 - avoiding bugs and how to find those you did not avoid.
- FreeRTOS-MPU
 - User vs. privileged mode, access permissions, defining MPU regions, linker configuration, practical usage tips.
- The FreeRTOS Download
 - Files and directories, demo apps, data types and coding style.

Method and Training Materials

Presentation and practical examples with host (Laptops with Ubuntu 14.04.x LTS) and target system (e.g. Beagle Bone Black Rev. C - <http://beagleboard.org/BLACK>)

The electronic devices will be provided during the training. There will be one workspace for two participants. A customized version of this training like FreeRTOS on LPCXPRESSO 1769 is offered by FreeRTOS.

Duration

3 days

Training fee

1.790 Euro plus VAT tax per person

The fee includes the training certificate, the training material, snacks, beverages and lunch.

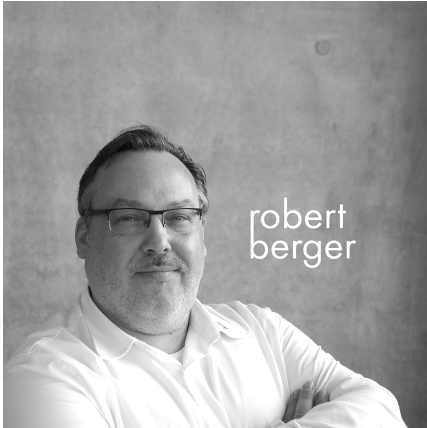
Number of Participants

6 to 12 participants

Location

Technologiezentrum TechBase, Franz-Mayer-Straße 1, D-93053 Regensburg

Trainer



Robert Berger

Since 1993, Robert Berger gathered experience in software design and development for embedded systems. He has used GNU/Linux on desktop and server class machines, but mainly for embedded system (automotive, industrial control, robotics, telecom, consumer electronics, etc.). Robert's expertise ranges from the smallest real-time systems (FreeRTOS) to set-ups with multiple processors/cores and embedded GNU/Linux (user-, kernel-space, device drivers, hardware interfacing, debugging, multi-core, Yocto Project) with a focus on free and open source software.

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