

| Introduction to Embedded Linux |

>> A Practical Approach

| Course Outline

 **Norik**  
Systems  
[www.norik.com](http://www.norik.com)





# | Embedded Linux Jumpstart |

## • Overview

The Linux operating system has been available for years for servers and desktops, and has continued to gain market share in both of these computing segments. Helping to drive this growth and lend credibility to Linux are well established companies such as IBM, Dell, Hewlett-Packard, Compaq, Oracle, and others. Linux, originally developed for the desktop and adapted for servers, is now making in-roads into the highly fragmented embedded market.

This 5-day *Introduction of Embedded Linux Training Course* is designed for software engineers and embedded system developers who need detailed knowledge and information of what the impact and tradeoffs are when considering using Embedded Linux in an embedded design. The lectures and primarily hands-on sessions will walk you through the steps needed when creating and customizing a Linux environment to support an embedded application. Much attention is placed on software and development kits that minimize the time-to-market.

## At the end of the course, the participant will learn:

- To build a base root-filesystem from scratch
- To configure and build a GNU-toolchain
- To cross-build a Linux kernel for an embedded system
- To use basic GNU tools for project management

## • Participants

Students are software developers building embedded systems, project managers looking to know more about Embedded Linux and engineers who want to know more about Embedded Linux.

## • Prerequisites

- Students are expected to be proficient in the C programming language.
- Well-versed in operating system concepts and familiar with Linux or a comparable development system.

## • Training Approach

- Hands-on  
There are continuous, ongoing hands-on throughout the course. Target boards will be provided.
- Small class size  
Not more than 15 students.
- Up to date information.  
We update the materials before every event.
- Straightforward explanations  
Technical concepts and terms are explained in English. You will walk away with a thorough understanding of the tradeoffs of using Embedded Linux in embedded systems and applications.
- 4 weeks of post e-mail support for course related questions on the course mailing list



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- **Certification**

There will be daily home-work assignments. The knowledge is tested on the last day with a hands-on session. Certification of successful participation is only granted if a minimum program is achieved and at least two assignments are completed.

- **Course Concepts**

- Primarily hands on - so that we can focus on procedures and on cross-development related issues in the first step, transition to the target as soon as possible but as late as necessary.
- Clear focus on the power of the command line, introducing powerful Unix/Linux tools along the way
- Toolchain related issues are emphasized as these generally cause more problems than design issues - not too much "theory" clear focus on practical application
- The goal is the participant can go home after 5 days, sit down and build his target system environment that will at least boot "something".
- Project management issues are also taken into account - tools used - environment policies.
- Using CVS and participating in community efforts

- **Trainer**

The trainer is an Embedded/Real-Time Linux Software developer from Austria. He is also the Real-Time Linux core designer and maintainer of RTLinux/GPL. He has 11 years experience in embedded real-time Linux applications with high performance computing and cluster administration. He has given talks, seminars and workshops for Real-Time Linux and Embedded Linux in Austria, Germany, France, Italy, Sweden, Spain, UK, Slovenia and the USA since 2000. He co-founded and organized The Real Time Linux Workshop in Vienna 1999, Orlando 2000, Milan 2001, Boston 2002, Valencia 2003, Singapore 2004 and Lille 2005.

For more information, please see Trainer's profile attached.

- **Duration**

5 full working days – 9:30am till 5:30pm

- **Course Outline**

- Introduction to Embedded Linux
- Basic filesystem
  - . The blinking cursor
  - . Introducing MTD - jffs2 and filesystem selection
  - . Busybox and tinylogin
  - . Adding real services
  - . Web-server
  - . SSH-server
- Using GNU Toolchains
  - . make
  - . automake/autoconf
  - . cvs, diff and patch
- Setting up a development environment
  - . gcc, binutils, gdb native
  - . Using a chroot env for first tests
  - . Moving it all to the target
  - . ramdisk
  - . nfs
  - . local filesystem on mtd, flash
- Kernel building
  - . Patching, configuring and installing native kernel
  - . Figuring out my current config build steps
  - . Config files and default module path
  - . Building a target kernel
- Testing on the target
  - . Serial port access
  - . Kernel configuration
  - . Minicom setup
  - . Building and testing a simple kernel module
  - . Basics of kernel modules
  - . nm, objdump, ksyms
- Adding the application layer
  - . Using kernel resources
  - . Tasklets
  - . Kernel threads
- POSIX threads intro
  - . Thread management
  - . Synchronization issues
  - . Thread synchronization
  - . UNIX signals



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- **For more information**

If you have any further enquiries on our Embedded Linux courses, do not hesitate to contact us.

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