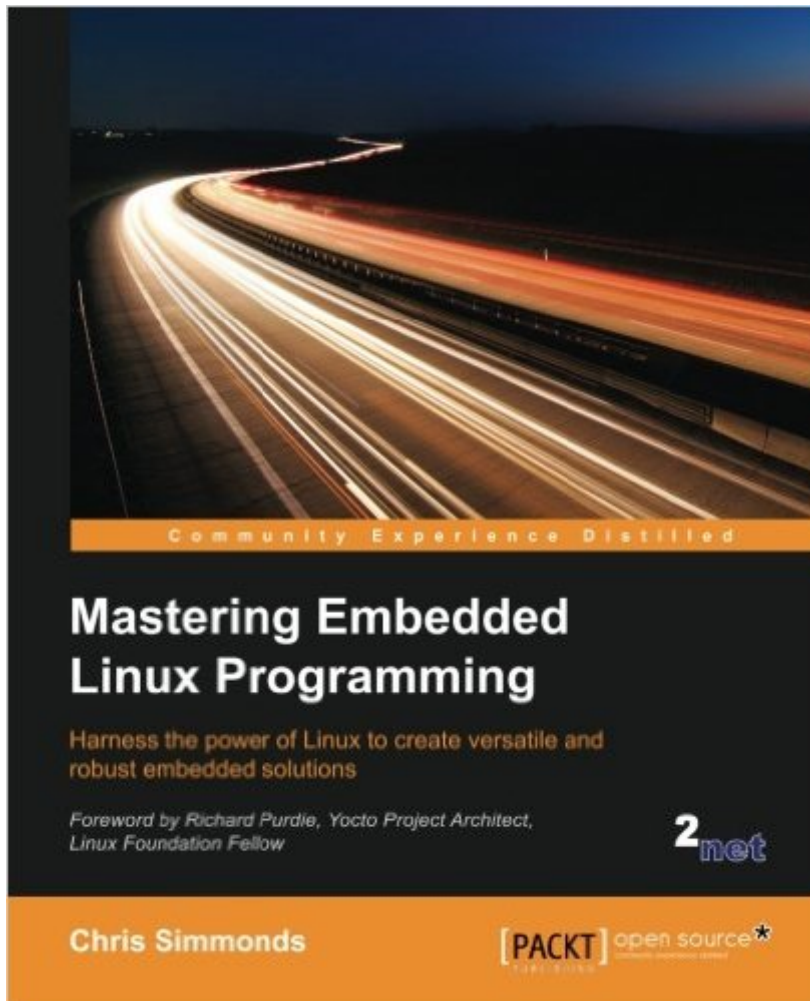


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Mastering Embedded Linux Programming



Synopsis

Key Features
Create efficient and secure embedded devices using Linux
Minimize project costs by using open source tools and programs
Explore each component technology in depth, using sample implementations as a guide
Book Description
Mastering Embedded Linux Programming takes you through the product cycle and gives you an in-depth description of the components and options that are available at each stage. You will begin by learning about toolchains, bootloaders, the Linux kernel, and how to configure a root filesystem to create a basic working device. You will then learn how to use the two most commonly used build systems, Buildroot and Yocto, to speed up and simplify the development process. Building on this solid base, the next section considers how to make best use of raw NAND/NOR flash memory and managed flash eMMC chips, including mechanisms for increasing the lifetime of the devices and to perform reliable in-field updates. Next, you need to consider what techniques are best suited to writing applications for your device. We will then see how functions are split between processes and the usage of POSIX threads, which have a big impact on the responsiveness and performance of the final device. The closing sections look at the techniques available to developers for profiling and tracing applications and kernel code using perf and ftrace.
What you will learn
Understand the role of the Linux kernel and select an appropriate role for your application
Use Buildroot and Yocto to create embedded Linux systems quickly and efficiently
Create customized bootloaders using U-Boot
Employ perf and ftrace to identify performance bottlenecks
Understand device trees and make changes to accommodate new hardware on your device
Write applications that interact with Linux device drivers
Design and write multi-threaded applications using POSIX threads
Measure real-time latencies and tune the Linux kernel to minimize them
About the Author
Chris Simmonds is a software consultant and trainer who lives in southern England. He has been using Linux in embedded systems since the late 1990s, during which he has worked on many interesting projects, including a stereoscopic camera, intelligent weighing scales, various set-top boxes and home routers, and even a large walking robot. He is a frequent presenter at open source and embedded conferences, including the Embedded Linux Conference, Embedded World, and the Android Builders' Summit. He has been conducting training courses and workshops in embedded Linux since 2002 and in embedded Android since 2010. He has delivered hundreds of sessions to many well-known companies. You can see some of his work on the "Inner Penguin" blog at www.2net.co.uk.
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Learning About Toolchains
All About Bootloaders
Porting and Configuring the Kernel
Building a Root Filesystem
Selecting a Build System
Creating a Storage Strategy
Introducing Device Drivers
Starting up - the init Program
Learning About Processes and Threads
Managing

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Customer Reviews

Considering how widely embedded Linux is used, we might expect more books on the subject. In fact, there are precious few, and it seems fewer are published now than ten years ago. Why is that? There is no shortage of books on other popular programming topics. It may be that writing competently about embedded Linux requires broader knowledge and greater skill. This new book *Mastering Embedded Linux Programming* is a surprisingly good book. The author clearly has deep experience and it shows in the selection, organization, and presentation of embedded Linux topics which include building cross toolchains, U-Boot, the Linux kernel, and Buildroot to generate the root filesystem. You need a platform to run these things and the author wisely offers examples on Beaglebone Black for actual hardware and QEMU for software platform emulation. I have experience with these technologies and platforms, but had to scrape up and adapt information as best I could at the time, so I can readily recognize coherent recipes that bring it all together. This book does that exceedingly well and should prove most useful to any experienced or aspiring embedded Linux developer. I am not just reading the book. I am working through the examples, trying the build examples on an inexpensive \$5/month cloud server. (Tip - If you have limited memory on the build server, such as 512 MB on a cloud server, configure 2 GB Linux swap space since that is needed by the Linux build tools.) I have found the examples to be entirely accurate so far, which is uncommon for embedded Linux guides and speaks well of the care taken by the author and

technical reviewers. This book is professionally written, accurate, and highly recommended.

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