

Essential Linux Device Drivers

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Wolfgang Mauerer



Essential Linux Device Drivers:

Essential Linux Device Drivers Sreekrishnan Venkateswaran, 2008-03-27 Probably the most wide ranging and complete Linux device driver book I've read Alan Cox Linux Guru and Key Kernel Developer Very comprehensive and detailed covering almost every single Linux device driver type Theodore Ts'o First Linux Kernel Developer in North America and Chief Platform Strategist of the Linux Foundation The Most Practical Guide to Writing Linux Device Drivers Linux now offers an exceptionally robust environment for driver development with today's kernels what once required years of development time can be accomplished in days In this practical example driven book one of the world's most experienced Linux driver developers systematically demonstrates how to develop reliable Linux drivers for virtually any device Essential Linux Device Drivers is for any programmer with a working knowledge of operating systems and C including programmers who have never written drivers before Sreekrishnan Venkateswaran focuses on the essentials bringing together all the concepts and techniques you need while avoiding topics that only matter in highly specialized situations Venkateswaran begins by reviewing the Linux 2.6 kernel capabilities that are most relevant to driver developers He introduces simple device classes then turns to serial buses such as I2C and SPI external buses such as PCMCIA PCI and USB video audio block network and wireless device drivers user space drivers and drivers for embedded Linux one of today's fastest growing areas of Linux development For each Venkateswaran explains the technology inspects relevant kernel source files and walks through developing a complete example Addresses drivers discussed in no other book including drivers for I2C video sound PCMCIA and different types of flash memory Demystifies essential kernel services and facilities including kernel threads and helper interfaces Teaches polling asynchronous notification and I/O control Introduces the Inter Integrated Circuit Protocol for embedded Linux drivers Covers multimedia device drivers using the Linux Video subsystem and Linux Audio framework Shows how Linux implements support for wireless technologies such as Bluetooth Infrared WiFi and cellular networking Describes the entire driver development lifecycle through debugging and maintenance Includes reference appendixes covering Linux assembly BIOS calls and Seq files

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development practices including Python packaging and deploying containerized applications These are followed by a chapter on writing multithreaded code and another on techniques to manage memory efficiently The final chapters demonstrate how to debug your code whether it resides in user space or in the Linux kernel itself In addition to GNU debugger GDB the book also covers the different tracers and profilers that are available for Linux so that you can quickly pinpoint any performance bottlenecks in your system By the end of this book you will be able to create efficient and secure embedded devices with Linux that will delight your users What you will learn Cross compile embedded Linux images with Buildroot and Yocto Enable Wi Fi and Bluetooth connectivity with a Yocto board support package Update IoT devices securely in the field with Mender or balena Prototype peripheral additions by connecting add on boards reading schematics and coding test programs Deploy containerized software applications on edge devices with Docker Debug devices remotely using GDB and measure the performance of systems using tools like perf and ply Who this book is for If you are a systems software engineer or system administrator who wants to learn how to apply Linux to embedded devices then this book is for you The book is also for embedded software engineers accustomed to programming low power microcontrollers and will help them make the leap to a high speed system on chips that can run Linux Anyone who develops hardware for Linux will find something useful in this book But before you get started you will need a solid grasp of the POSIX standard C programming and shell scripting

Professional Linux Kernel Architecture Wolfgang Mauerer,2010-03-11 Find an introduction to the architecture concepts and algorithms of the Linux kernel in Professional Linux Kernel Architecture a guide to the kernel sources and large number of connections among subsystems Find an introduction to the relevant structures and functions exported by the kernel to userland understand the theoretical and conceptual aspects of the Linux kernel and Unix derivatives and gain a deeper understanding of the kernel Learn how to reduce the vast amount of information contained in the kernel sources and obtain the skills necessary to understand the kernel sources *Mastering Embedded Linux Programming* Chris Simmonds,2017-06-30 Learn to confidently develop debug and deploy robust embedded Linux systems with hands on examples using BeagleBone and QEMU Key Features Step by step guide from toolchain setup to real time programming with hands on implementation Practical insights on kernel configuration device drivers and memory management Covers hardware integration using BeagleBone Black and virtual environments via QEMU Book DescriptionEmbedded Linux runs many of the devices we use every day from smart TVs to WiFi routers test equipment to industrial controllers all of them have Linux at their heart Linux is a core technology in the implementation of the inter connected world of the Internet of Things You will begin by learning about the fundamental elements that underpin all embedded Linux projects the toolchain the bootloader the kernel and the root filesystem You ll see how to create each of these elements from scratch and how to automate the process using Buildroot and the Yocto Project Moving on you ll find out how to implement an effective storage strategy for flash memory chips and how to install updates to the device remotely once it is deployed You ll also get to know

the key aspects of writing code for embedded Linux such as how to access hardware from applications the implications of writing multi threaded code and techniques to manage memory in an efficient way The final chapters show you how to debug your code both in applications and in the Linux kernel and how to profile the system so that you can look out for performance bottlenecks By the end of the book you will have a complete overview of the steps required to create a successful embedded Linux system What you will learn Evaluate the Board Support Packages offered by most manufacturers of a system on chip or embedded module Use Buildroot and the Yocto Project to create embedded Linux systems quickly and efficiently Update IoT devices in the field without compromising security Reduce the power budget of devices to make batteries last longer Interact with the hardware without having to write kernel device drivers Debug devices remotely using GDB and see how to measure the performance of the systems using powerful tools such as `perf` `ftrace` and `valgrind` Who this book is for This book is for embedded engineers Linux developers and computer science students looking to build real world embedded systems It suits readers who are familiar with basic Linux use and want to deepen their skills in kernel configuration debugging and device integration

[Debugging Linux Systems \(Digital Short Cut\)](#) Sreekrishnan Venkateswaran,2009-11-03 Debugging Linux Systems discusses the main tools available today to debug 2.6 Linux Kernels We start by exploring the seemingly esoteric operations of the Kernel Debugger KDBG Kernel GNU DeBugger KGDB the plain GNU DeBugger GDB and JTAG debuggers We then investigate Kernel Probes a feature that lets you intrude into a kernel function and extract debug information or apply a medicated patch Analyzing a crash dump can yield clues for postmortem analysis of kernel crashes or hangs so we take a look at Kdump a serviceability tool that collects a system dump after spawning a new kernel Profiling points you to code regions that burn more CPU cycles so we learn to use the OProfile kernel profiler and the gprof application profiler to sense the presence of code bottlenecks Because tracing provides insight into behavioral problems that manifest during interactions between different code modules we delve into the Linux Trace Toolkit a system designed for high volume trace capture The section Debugging Embedded Linux takes a tour of the I/O interfaces commonly found on embedded hardware such as flash memory serial port PCMCIA Secure Digital media USB RTC audio video touch screen and Bluetooth and provides pointers to debug the associated device drivers We also pick up some board level debugging skills with the help of a case study The section Debugging Network Throughput takes you through some device driver design issues and protocol implementation characteristics that can affect the horsepower of your network interface card We end the shortcut by examining several options available in the kernel configuration menu that can emit valuable debug information

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Reviewing **Essential Linux Device Drivers**: Unlocking the Spellbinding Force of Linguistics

In a fast-paced world fueled by information and interconnectivity, the spellbinding force of linguistics has acquired newfound prominence. Its capacity to evoke emotions, stimulate contemplation, and stimulate metamorphosis is actually astonishing. Within the pages of "**Essential Linux Device Drivers**," an enthralling opus penned by a very acclaimed wordsmith, readers set about an immersive expedition to unravel the intricate significance of language and its indelible imprint on our lives. Throughout this assessment, we shall delve into the book's central motifs, appraise its distinctive narrative style, and gauge its overarching influence on the minds of its readers.

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