

The Art Of Linux Kernel Design Illustrating The Operating System Design Principle And Implementation

Freely available source code, with contributions from thousands of programmers around the world: this is the spirit of the software revolution known as Open Source. Open Source has grabbed the computer industry's attention. Netscape has opened the source code to Mozilla; IBM supports Apache; major database vendors have ported their products to Linux. As enterprises realize the power of the open-source development model, Open Source is becoming a viable mainstream alternative to commercial software. Now in Open Sources, leaders of Open Source come together for the first time to discuss the new vision of the software industry they have created. The essays in this volume offer insight into how the Open Source movement works, why it succeeds, and where it is going. For programmers who have labored on open-source projects, Open Sources is the new gospel: a powerful vision

from the movement's spiritual leaders. For businesses integrating open-source software into their enterprise, Open Sources reveals the mysteries of how open development builds better software, and how businesses can leverage freely available software for a competitive business advantage. The contributors here have been the leaders in the open-source arena: Brian Behlendorf (Apache) Kirk McKusick (Berkeley Unix) Tim O'Reilly (Publisher, O'Reilly & Associates) Bruce Perens (Debian Project, Open Source Initiative) Tom Paquin and Jim Hamerly (mozilla.org, Netscape) Eric Raymond (Open Source Initiative) Richard Stallman (GNU, Free Software Foundation, Emacs) Michael Tiemann (Cygnus Solutions) Linus Torvalds (Linux) Paul Vixie (Bind) Larry Wall (Perl) This book explains why the majority of the Internet's servers use open-source technologies for everything from the operating system to Web serving and email. Key technology products developed with open-source software have overtaken and surpassed the commercial efforts of billion dollar companies like Microsoft and IBM to dominate software markets. Learn the inside story

of what led Netscape to decide to release its source code using the open-source mode. Learn how Cygnus Solutions builds the world's best compilers by sharing the source code. Learn why venture capitalists are eagerly watching Red Hat Software, a company that gives its key product -- Linux -- away. For the first time in print, this book presents the story of the open-source phenomenon told by the people who created this movement. Open Sources will bring you into the world of free software and show you the revolution.

Disc contains: linux-0.01 -- linux-2.4.1 -- linux-2.4.5 -- Tags files for all included kernel distributions -- lckc_code -- lckc-find-line.el -- Cross-reference listing for lckc_code.

Explore Implementation of core kernel subsystems About This Book Master the design, components, and structures of core kernel subsystems Explore kernel programming interfaces and related algorithms under the hood Completely updated material for the 4.12.10 kernel Who This Book Is For If you are a kernel programmer with a knowledge of kernel APIs and are looking to build a comprehensive understanding, and eager to explore

the implementation, of kernel subsystems, this book is for you. It sets out to unravel the underlying details of kernel APIs and data structures, piercing through the complex kernel layers and gives you the edge you need to take your skills to the next level. What You Will Learn Comprehend processes and fles—the core abstraction mechanisms of the Linux kernel that promote effective simplification and dynamism Decipher process scheduling and understand effective capacity utilization under general and real-time dispositions Simplify and learn more about process communication techniques through signals and IPC mechanisms Capture the rudiments of memory by grasping the key concepts and principles of physical and virtual memory management Take a sharp and precise look at all the key aspects of interrupt management and the clock subsystem Understand concurrent execution on SMP platforms through kernel synchronization and locking techniques In Detail Mastering Linux Kernel Development looks at the Linux kernel, its internal arrangement and design, and various core subsystems, helping you to gain significant understanding of

this open source marvel. You will look at how the Linux kernel, which possesses a kind of collective intelligence thanks to its scores of contributors, remains so elegant owing to its great design. This book also looks at all the key kernel code, core data structures, functions, and macros, giving you a comprehensive foundation of the implementation details of the kernel's core services and mechanisms. You will also look at the Linux kernel as well-designed software, which gives us insights into software design in general that are easily scalable yet fundamentally strong and safe. By the end of this book, you will have considerable understanding of and appreciation for the Linux kernel. Style and approach Each chapter begins with the basic conceptual know-how for a subsystem and extends into the details of its implementation. We use appropriate code excerpts of critical routines and data structures for subsystems. A Guide to Kernel Exploitation: Attacking the Core discusses the theoretical techniques and approaches needed to develop reliable and effective kernel-level exploits, and applies them to different operating systems, namely, UNIX derivatives, Mac OS

X, and Windows. Concepts and tactics are presented categorically so that even when a specifically detailed vulnerability has been patched, the foundational information provided will help hackers in writing a newer, better attack; or help pen testers, auditors, and the like develop a more concrete design and defensive structure. The book is organized into four parts. Part I introduces the kernel and sets out the theoretical basis on which to build the rest of the book. Part II focuses on different operating systems and describes exploits for them that target various bug classes. Part III on remote kernel exploitation analyzes the effects of the remote scenario and presents new techniques to target remote issues. It includes a step-by-step analysis of the development of a reliable, one-shot, remote exploit for a real vulnerability a bug affecting the SCTP subsystem found in the Linux kernel. Finally, Part IV wraps up the analysis on kernel exploitation and looks at what the future may hold. Covers a range of operating system families — UNIX derivatives, Mac OS X, Windows Details common scenarios such as generic memory corruption (stack overflow, heap overflow,

etc.) issues, logical bugs and race conditions Delivers the reader from user-land exploitation to the world of kernel-land (OS) exploits/attacks, with a particular focus on the steps that lead to the creation of successful techniques, in order to give to the reader something more than just a set of tricks

Linux Core Kernel Commentary

A Top-down Approach for X86 and PowerPC Architectures

A comprehensive guide to kernel internals, writing kernel modules, and kernel synchronization

Kernel Projects for Linux

IA-64 Linux Kernel

Design and Implementation

Master the art of developing customized device drivers for your embedded Linux systems Key Features Stay up to date with the Linux PCI, ASoC, and V4L2 subsystems and write device drivers for them Get to grips with the Linux kernel power management infrastructure Adopt a practical approach to customizing your Linux environment using best practices Book Description Linux is one of the fastest-growing operating systems around the world, and in the last few years, the Linux kernel has evolved significantly to support a wide variety of embedded devices with its improved subsystems and a range of new features. With this book, you'll find out how you can enhance your skills to write

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custom device drivers for your Linux operating system. Mastering Linux Device Driver Development provides complete coverage of kernel topics, including video and audio frameworks, that usually go unaddressed. You'll work with some of the most complex and impactful Linux kernel frameworks, such as PCI, ALSA for SoC, and Video4Linux2, and discover expert tips and best practices along the way. In addition to this, you'll understand how to make the most of frameworks such as NVMEM and Watchdog. Once you've got to grips with Linux kernel helpers, you'll advance to working with special device types such as Multi-Function Devices (MFD) followed by video and audio device drivers. By the end of this book, you'll be able to write feature-rich device drivers and integrate them with some of the most complex Linux kernel frameworks, including V4L2 and ALSA for SoC. What you will learn
Explore and adopt Linux kernel helpers for locking, work deferral, and interrupt management
Understand the Regmap subsystem to manage memory accesses and work with the IRQ subsystem
Get to grips with the PCI subsystem and write reliable drivers for PCI devices
Write full multimedia device drivers using ALSA SoC and the V4L2 framework
Build power-aware device drivers using the kernel power management framework
Find out how to get the most out of miscellaneous kernel subsystems such as NVMEM and Watchdog
Who this book is for This book is for embedded developers, Linux system engineers, and system programmers who want to explore Linux kernel frameworks and subsystems. C programming skills and a basic understanding of driver development are necessary to get started with this book.
Uses the Running Operation as the Main Thread Difficulty in understanding an operating system (OS) lies not in the technical aspects, but in the complex relationships

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inside the operating systems. The Art of Linux Kernel Design: Illustrating the Operating System Design Principle and Implementation addresses this complexity. Written from the perspective of the designer of an operating system, this book tackles important issues and practical problems on how to understand an operating system completely and systematically. It removes the mystery, revealing operating system design guidelines, explaining the BIOS code directly related to the operating system, and simplifying the relationships and guiding ideology behind it all. Based on the Source Code of a Real Multi-Process Operating System Using the 0.11 edition source code as a representation of the Linux basic design, the book illustrates the real states of an operating system in actual operations. It provides a complete, systematic analysis of the operating system source code, as well as a direct and complete understanding of the real operating system run-time structure. The author includes run-time memory structure diagrams, and an accompanying essay to help readers grasp the dynamics behind Linux and similar software systems. Identifies through diagrams the location of the key operating system data structures that lie in the memory Indicates through diagrams the current operating status information which helps users understand the interrupt state, and left time slice of processes Examines the relationship between process and memory, memory and file, file and process, and the kernel Explores the essential association, preparation, and transition, which is the vital part of operating system Develop a System of Your Own This text offers an in-depth study on mastering the operating system, and provides an important prerequisite for designing a whole new operating system.

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Build your expertise in the BPF virtual machine in the Linux kernel with this practical guide for systems engineers. You'll not only dive into the BPF program lifecycle but also learn to write applications that observe and modify the kernel's behavior; inject code to monitor, trace, and securely observe events in the kernel; and more. Authors David Calavera and Lorenzo Fontana help you harness the power of BPF to make any computing system more observable. Familiarize yourself with the essential concepts you'll use on a day-to-day basis and augment your knowledge about performance optimization, networking, and security. Then see how it all comes together with code examples in C, Go, and Python. Write applications that use BPF to observe and modify the Linux kernel's behavior on demand Inject code to monitor, trace, and observe events in the kernel in a secure way—no need to recompile the kernel or reboot the system Explore code examples in C, Go, and Python Gain a more thorough understanding of the BPF program lifecycle

Nwely updated to include new calls and techniques introduced in Versions 2.2 and 2.4 of the Linux kernel, a definitive resource for those who want to support computer peripherals under the Linux operating system explains how to write a driver for a broad spectrum of devices, including character devices, network interfaces, and block devices. Original. (Intermediate)

Linux in a Nutshell

Building Embedded Linux Systems

Hands-On System Programming with Linux

Musings on Linux and Open Source by an Accidental Revolutionary

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Mastering Linux Kernel Development

The Art of Writing Efficient Programs

Linux® is being adopted by an increasing number of embedded systems developers, who have been won over by its sophisticated scheduling and networking, its cost-free license, its open development model, and the support offered by rich and powerful programming tools. While there is a great deal of hype surrounding the use of Linux in embedded systems, there is not a lot of practical information. Building Embedded Linux Systems is the first in-depth, hard-core guide to putting together an embedded system based on the Linux kernel. This indispensable book features arcane and previously undocumented procedures for:

- Building your own GNU development toolchain**
- Using an efficient embedded development framework**
- Selecting, configuring, building, and installing a target-specific kernel**
- Creating a complete target root filesystem**
- Setting up, manipulating, and using solid-state storage devices**
- Installing and configuring a bootloader for the target**

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Cross-compiling a slew of utilities and packages Debugging your embedded system using a plethora of tools and techniques Details are provided for various target architectures and hardware configurations, including a thorough review of Linux's support for embedded hardware. All explanations rely on the use of open source and free software packages. By presenting how to build the operating system components from pristine sources and how to find more documentation or help, this book greatly simplifies the task of keeping complete control over one's embedded operating system, whether it be for technical or sound financial reasons. Author Karim Yaghmour, a well-known designer and speaker who is responsible for the Linux Trace Toolkit, starts by discussing the strengths and weaknesses of Linux as an embedded operating system. Licensing issues are included, followed by a discussion of the basics of building embedded Linux systems. The configuration, setup, and use of over forty different open source and free software packages commonly used in embedded Linux systems

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are also covered. uClibc, BusyBox, U-Boot, OpenSSH, tftpd, tftp, strace, and gdb are among the packages discussed. With Kernel Projects for Linux, Professor Gary Nutt provides a series of 12 lab exercises that illustrate how to implement core operating system concepts in the increasingly popular Linux environment. The makeup of the manual allows readers to learn concepts on a modern operating system—Linux—while at the same time viewing the source code. This hands-on manual complements any core OS book by demonstrating how theoretical concepts are realized in Linux. Part I presents an overview of the Linux design, offering some insight into such topics as runtime organization and process, file, and device management. Part II consists of a graduated set of exercises where readers move from inspecting various aspects of the operating systems's internals to developing their own functions and data structures for the Linux kernel. This book is designed for programmers who need to learn the fundamentals of operating systems on a modern OS. The progressively harder

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exercises allow them to learn concepts in a hands-on setting.

To thoroughly understand what makes Linux tick and why it's so efficient, you need to delve deep into the heart of the operating system--into the Linux kernel itself. The kernel is Linux--in the case of the Linux operating system, it's the only bit of software to which the term "Linux" applies. The kernel handles all the requests or completed I/O operations and determines which programs will share its processing time, and in what order. Responsible for the sophisticated memory management of the whole system, the Linux kernel is the force behind the legendary Linux efficiency. The new edition of Understanding the Linux Kernel takes you on a guided tour through the most significant data structures, many algorithms, and programming tricks used in the kernel. Probing beyond the superficial features, the authors offer valuable insights to people who want to know how things really work inside their machine. Relevant segments of code are dissected and

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discussed line by line. The book covers more than just the functioning of the code, it explains the theoretical underpinnings for why Linux does things the way it does. The new edition of the book has been updated to cover version 2.4 of the kernel, which is quite different from version 2.2: the virtual memory system is entirely new, support for multiprocessor systems is improved, and whole new classes of hardware devices have been added. The authors explore each new feature in detail. Other topics in the book include: Memory management including file buffering, process swapping, and Direct memory Access (DMA) The Virtual Filesystem and the Second Extended Filesystem Process creation and scheduling Signals, interrupts, and the essential interfaces to device drivers Timing Synchronization in the kernel Interprocess Communication (IPC) Program execution Understanding the Linux Kernel, Second Edition will acquaint you with all the inner workings of Linux, but is more than just an academic exercise. You'll learn what conditions bring out Linux's

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best performance, and you'll see how it meets the challenge of providing good system response during process scheduling, file access, and memory management in a wide variety of environments. If knowledge is power, then this book will help you make the most of your Linux system. Introduces the features of the C programming language, discusses data types, variables, operators, control flow, functions, pointers, arrays, and structures, and looks at the UNIX system interface

Professional Linux Kernel Architecture

Embedded Linux Primer

Explore Linux system programming interfaces, theory, and practice

Systems Performance

Linux Containers and Virtualization

Open Sources

Provides information on writing a driver in Linux, covering such topics as character devices, network interfaces, driver debugging, concurrency, and interrupts.

If you are a software developer with little or no experience of versioning systems, or are familiar with

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other centralized versioning systems, then this book is for you. If you have some experience working with command lines or using Linux admin or just using Unix and want to know more about Git, then this book is ideal for you.

Memory forensics provides cutting edge technology to help investigate digital attacks Memory forensics is the art of analyzing computer memory (RAM) to solve digital crimes. As a follow-up to the best seller Malware Analyst's Cookbook, experts in the fields of malware, security, and digital forensics bring you a step-by-step guide to memory forensics—now the most sought after skill in the digital forensics and incident response fields. Beginning with introductory concepts and moving toward the advanced, The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory is based on a five day training course that the authors have presented to hundreds of students. It is the only book on the market that focuses exclusively on memory forensics and how to deploy such techniques properly. Discover memory forensics techniques: How volatile memory analysis improves digital investigations Proper investigative steps for detecting stealth malware and advanced threats How to use free, open source tools for conducting thorough memory forensics Ways to acquire memory from suspect systems in a forensically sound manner The next era of malware and security breaches are more sophisticated and targeted, and the volatile memory of a computer is often overlooked or destroyed as part of the incident response process. The Art of Memory Forensics explains the latest technological innovations in digital forensics to help bridge this gap. It covers the most popular and recently released versions of Windows, Linux, and Mac, including both the 32 and 64-bit editions.

BPF and related observability tools give software professionals unprecedented visibility into software, helping them analyze operating system and application performance, troubleshoot code, and strengthen security. BPF Performance Tools: Linux System and Application Observability is the industry's most

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comprehensive guide to using these tools for observability. Brendan Gregg, author of the industry's definitive guide to system performance, introduces powerful new methods and tools for doing analysis that leads to more robust, reliable, and safer code. This authoritative guide: Explores a wide spectrum of software and hardware targets Thoroughly covers open source BPF tools from the Linux Foundation iovisor project's bcc and bpftrace repositories Summarizes performance engineering and kernel internals you need to understand Provides and discusses 150+ bpftrace tools, including 80 written specifically for this book: tools you can run as-is, without programming — or customize and develop further, using diverse interfaces and the bpftrace front-end You'll learn how to use BPF (eBPF) tracing tools to analyze CPUs, memory, disks, file systems, networking, languages, applications, containers, hypervisors, security, and the Linux kernel. You'll move from basic to advanced tools and techniques, producing new metrics, stack traces, custom latency histograms, and more. It's like having a superpower: with Gregg's guidance and tools, you can analyze virtually everything that impacts system performance, so you can improve virtually any Linux operating system or application.

Talking Directly to the Kernel and C Library

A Guide to Kernel Exploitation

Understanding the Linux Kernel

Mastering Linux Device Driver Development

Linux Kernel in a Nutshell

A kernel developer's reference manual

Linux Kernel Networking takes you on a guided in-depth tour of the current Linux networking implementation and the

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theory behind it. Linux kernel networking is a complex topic, so the book won't burden you with topics not directly related to networking. This book will also not overload you with cumbersome line-by-line code walkthroughs not directly related to what you're searching for; you'll find just what you need, with in-depth explanations in each chapter and a quick reference at the end of each chapter. Linux Kernel Networking is the only up-to-date reference guide to understanding how networking is implemented, and it will be indispensable in years to come since so many devices now use Linux or operating systems based on Linux, like Android, and since Linux is so prevalent in the data center arena, including Linux-based virtualization technologies like Xen and KVM.

Since the introduction of Linux version 1.2 in March 1995, a worldwide community has evolved from programmers who were attracted by the reliability and flexibility of this completely free operating system. Now at version 2.0, Linux is no longer simply the operating system of choice for

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hackers, but is being successfully employed in commercial software development, by Internet providers and in research and teaching. This book is written for anybody who wants to learn more about Linux. It explains the inner mechanisms of Linux from process scheduling to memory management and file systems, and will tell you all you need to know about the structure of the kernel, the heart of the Linux operating system. This New Edition: has been thoroughly updated throughout to cover Linux 2.0 shows you how the Linux operating system actually works so that you can start to program the Linux kernel for yourself introduces the kernel sources and describes basic algorithms and data structures, such as scheduling and task structure helps you to understand file systems, networking, and how systems boot The accompanying CD-ROM contains Slackware distribution 3.1 together with its complete source code, the Linux kernel sources up to version 2.0.27, the PC speaker driver, and a wealth of documentation. 0201331438B04062001
Get up and running with system programming concepts in Linux

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Key Features Acquire insight on Linux system architecture and its programming interfaces Get to grips with core concepts such as process management, signalling and pthreads Packed with industry best practices and dozens of code examples **Book Description** The Linux OS and its embedded and server applications are critical components of today's software infrastructure in a decentralized, networked universe. The industry's demand for proficient Linux developers is only rising with time. Hands-On System Programming with Linux gives you a solid theoretical base and practical industry-relevant descriptions, and covers the Linux system programming domain. It delves into the art and science of Linux application programming— system architecture, process memory and management, signaling, timers, pthreads, and file IO. This book goes beyond the use API X to do Y approach; it explains the concepts and theories required to understand programming interfaces and design decisions, the tradeoffs made by experienced developers when using them, and the rationale behind them. Troubleshooting tips and techniques

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are included in the concluding chapter. By the end of this book, you will have gained essential conceptual design knowledge and hands-on experience working with Linux system programming interfaces. What you will learn

Explore the theoretical underpinnings of Linux system architecture

Understand why modern OSes use virtual memory and dynamic memory APIs

Get to grips with dynamic memory issues and effectively debug them

Learn key concepts and powerful system APIs related to process management

Effectively perform file IO and use signaling and timers

Deeply understand multithreading concepts, pthreads APIs, synchronization and scheduling

Who this book is for

Hands-On System Programming with Linux is for Linux system engineers, programmers, or anyone who wants to go beyond using an API set to understanding the theoretical underpinnings and concepts behind powerful Linux system programming APIs. To get the most out of this book, you should be familiar with Linux at the user-level logging in, using shell via the command line interface, the ability to

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use tools such as `find`, `grep`, and `sort`. Working knowledge of the C programming language is required. No prior experience with Linux systems programming is assumed.

Learn how to write high-quality kernel module code, solve common Linux kernel programming issues, and understand the fundamentals of Linux kernel internals

Key Features

Discover how to write kernel code using the Loadable Kernel Module framework

Explore industry-grade techniques to perform efficient memory allocation and data synchronization within the kernel

Understand the essentials of key internals topics such as kernel architecture, memory management, CPU scheduling, and kernel synchronization

Book Description

Linux Kernel Programming is a comprehensive introduction for those new to Linux kernel and module development. This easy-to-follow guide will have you up and running with writing kernel code in next-to-no time. This book uses the latest 5.4 Long-Term Support (LTS) Linux kernel, which will be maintained from November 2019 through to December 2025. By working with the 5.4 LTS kernel throughout the book, you can

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be confident that your knowledge will continue to be valid for years to come. You'll start the journey by learning how to build the kernel from the source. Next, you'll write your first kernel module using the powerful Loadable Kernel Module (LKM) framework. The following chapters will cover key kernel internals topics including Linux kernel architecture, memory management, and CPU scheduling. During the course of this book, you'll delve into the fairly complex topic of concurrency within the kernel, understand the issues it can cause, and learn how they can be addressed with various locking technologies (mutexes, spinlocks, atomic, and refcount operators). You'll also benefit from more advanced material on cache effects, a primer on lock-free techniques within the kernel, deadlock avoidance (with lockdep), and kernel lock debugging techniques. By the end of this kernel book, you'll have a detailed understanding of the fundamentals of writing Linux kernel module code for real-world projects and products. What you will learnWrite high-quality modular kernel code (LKM framework) for 5.x

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kernelsConfigure and build a kernel from sourceExplore the Linux kernel architectureGet to grips with key internals regarding memory management within the kernelUnderstand and work with various dynamic kernel memory alloc/dealloc APIsDiscover key internals aspects regarding CPU scheduling within the kernelGain an understanding of kernel concurrency issuesFind out how to work with key kernel synchronization primitivesWho this book is for This book is for Linux programmers beginning to find their way with Linux kernel development. If you're a Linux kernel and driver developer looking to overcome frequent and common kernel development issues, or understand kernel intervals, you'll find plenty of useful information. You'll need a solid foundation of Linux CLI and C programming before you can jump in. Write custom device drivers to support computer peripherals in Linux operating systems
Linux Kernel Programming Part 2 - Char Device Drivers and Kernel Synchronization
Linux Device Drivers

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Linux Kernel Programming

Voices from the Open Source Revolution

The Linux Kernel Primer

Get a novel perspective on Linux containers and understand the world of virtualization. This book takes you down the rabbit hole to discover what lies below the API. You'll go on a journey of virtualization and see how containers are realized in the Linux world. Linux Containers and Virtualization details the data structures within the Linux kernel which make up Linux containers. You will start with the fundamentals of virtualization including how different resources such as memory, CPU, network, and storage are virtualized. Then you will move on to hypervisors and virtualization using the Kernel virtual Machine (KVM) and Quick Emulator (QEMU). Next, you will learn about Linux namespace, cgroups, and layered file systems, which are the essential building blocks of Linux containers. The explanation traverses the Linux kernel codebase to show how these are realized in the Linux kernel. In the final chapter, you will code your own container by applying the concepts learnt in the previous chapters. On completion of the book, you will have the knowledge to start coding a Linux container. What You Will Learn

Understand the basics of virtualization Discover how the Linux kernel supports virtualization See how the evolution of the Linux kernel and CPUs

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led to the creation of containerization technologies Develop the ability to create your own container framework Who This Book Is For Developers working on virtualized software deployment and containers. Architects designing platforms based on a container runtime as well as DevOps professionals who want to get a microscopic view on how containers and virtualization work would find the book useful.

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. Over the last few years, Linux has grown both as an operating system and a tool for personal and business use. Simultaneously becoming more user friendly and more powerful as a back-end system, Linux has achieved new plateaus: the newer filesystems have solidified, new commands and tools have appeared and become standard, and the desktop--including new desktop environments--have proved to be viable, stable, and readily

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accessible to even those who don't consider themselves computer gurus. Whether you're using Linux for personal software projects, for a small office or home office (often termed the SOHO environment), to provide services to a small group of colleagues, or to administer a site responsible for millions of email and web connections each day, you need quick access to information on a wide range of tools. This book covers all aspects of administering and making effective use of Linux systems. Among its topics are booting, package management, and revision control. But foremost in Linux in a Nutshell are the utilities and commands that make Linux one of the most powerful and flexible systems available. Now in its fifth edition, Linux in a Nutshell brings users up-to-date with the current state of Linux. Considered by many to be the most complete and authoritative command reference for Linux available, the book covers all substantial user, programming, administration, and networking commands for the most common Linux distributions. Comprehensive but concise, the fifth edition has been updated to cover new features of major Linux distributions. Configuration information for the rapidly growing commercial network services and community update services is one of the subjects covered for the first time. But that's just the beginning. The book covers editors, shells, and LILO and GRUB boot options. There's also coverage of Apache, Samba, Postfix, sendmail, CVS, Subversion,

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Emacs, vi, sed, gawk, and much more. Everything that system administrators, developers, and power users need to know about Linux is referenced here, and they will turn to this book again and again.

Up-to-the-Minute, Complete Guidance for Developing Embedded Solutions with Linux Linux has emerged as today's #1 operating system for embedded products. Christopher Hallinan's *Embedded Linux Primer* has proven itself as the definitive real-world guide to building efficient, high-value, embedded systems with Linux. Now, Hallinan has thoroughly updated this highly praised book for the newest Linux kernels, capabilities, tools, and hardware support, including advanced multicore processors. Drawing on more than a decade of embedded Linux experience, Hallinan helps you rapidly climb the learning curve, whether you're moving from legacy environments or you're new to embedded programming. Hallinan addresses today's most important development challenges and demonstrates how to solve the problems you're most likely to encounter. You'll learn how to build a modern, efficient embedded Linux development environment, and then utilize it as productively as possible. Hallinan offers up-to-date guidance on everything from kernel configuration and initialization to bootloaders, device drivers to file systems, and BusyBox utilities to real-time configuration and system analysis. This edition adds entirely new chapters on UDEV, USB, and open

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source build systems. Tour the typical embedded system and development environment and understand its concepts and components. Understand the Linux kernel and userspace initialization processes. Preview bootloaders, with specific emphasis on U-Boot. Configure the Memory Technology Devices (MTD) subsystem to interface with flash (and other) memory devices. Make the most of BusyBox and latest open source development tools. Learn from expanded and updated coverage of kernel debugging. Build and analyze real-time systems with Linux. Learn to configure device files and driver loading with UDEV. Walk through detailed coverage of the USB subsystem. Introduces the latest open source embedded Linux build systems. Reference appendices include U-Boot and BusyBox commands.

Techniques and Technologies

The Cathedral & the Bazaar

Understanding Linux Network Internals

The Art of Memory Forensics

The C Programming Language

UNIX, UNIX LINUX & UNIX TCL/TK. Write software that makes the most effective use of the Linux system, including the kernel and core system libraries. The majority of both Unix and Linux code is still written at the

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system level, and this book helps you focus on everything above the kernel, where applications such as Apache, bash, cp, vim, Emacs, gcc, gdb, glibc, ls, mv, and X exist. Written primarily for engineers looking to program at the low level, this updated edition of Linux System Programming gives you an understanding of core internals that makes for better code, no matter where it appears in the stack. -- Provided by publisher.

Benvenuti describes the relationship between the Internet's TCP/IP implementation and the Linux Kernel so that programmers and advanced administrators can modify and fine-tune their network environment. Open source provides the competitive advantage in the Internet Age. According to the August Forrester Report, 56 percent of IT managers interviewed at Global 2,500 companies are already using some type of open source software in their infrastructure and another 6 percent will install it in the next two years. This revolutionary model for collaborative software development is being embraced and studied by many of the biggest players in the high-tech industry, from Sun Microsystems to IBM to Intel. The Cathedral & the Bazaar is a must for anyone who cares about the future of the computer industry or the dynamics of the information economy. Already, billions of dollars have been made and lost based on the ideas in this book. Its conclusions will be studied, debated, and implemented for years to come. According to Bob Young, "This is Eric

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Raymond's great contribution to the success of the open source revolution, to the adoption of Linux-based operating systems, and to the success of open source users and the companies that supply them."The interest in open source software development has grown enormously in the past year. This revised and expanded paperback edition includes new material on open source developments in 1999 and 2000. Raymond's clear and effective writing style accurately describing the benefits of open source software has been key to its success. With major vendors creating acceptance for open source within companies, independent vendors will become the open source story in 2001.

"This book discusses non-distributed operating systems that benefit researchers, academicians, and practitioners"--Provided by publisher. Create user-kernel interfaces, work with peripheral I/O, and handle hardware interrupts

Advanced Operating Systems and Kernel Applications: Techniques and Technologies

Linux System Programming

A Kernel Perspective

Detecting Malware and Threats in Windows, Linux, and Mac Memory

An advanced programmer's guide to efficient hardware utilization and compiler optimizations using C++ examples

Become a better programmer with performance improvement techniques such as

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concurrency, lock-free programming, atomic operations, parallelism, and memory management

Key Features

- Learn proven techniques from a heavyweight and recognized expert in C++ and high-performance computing
- Understand the limitations of modern CPUs and their performance impact
- Find out how you can avoid writing inefficient code and get the best optimizations from the compiler
- Learn the tradeoffs and costs of writing high-performance programs

Book Description

The great free lunch of "performance taking care of itself" is over. Until recently, programs got faster by themselves as CPUs were upgraded, but that doesn't happen anymore. The clock frequency of new processors has almost peaked, and while new architectures provide small improvements to existing programs, this only helps slightly. To write efficient software, you now have to know how to program by making good use of the available computing resources, and this book will teach you how to do that. The Art of Efficient Programming covers all the major aspects of writing efficient programs, such as using CPU resources and memory efficiently, avoiding unnecessary computations, measuring performance, and how to put concurrency and multithreading to good use. You'll also learn about compiler optimizations and how to use the programming language (C++) more efficiently. Finally, you'll understand how design decisions impact performance. By the end of this book, you'll not only

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have enough knowledge of processors and compilers to write efficient programs, but you'll also be able to understand which techniques to use and what to measure while improving performance. At its core, this book is about learning how to learn. What you will learn

- Discover how to use the hardware computing resources in your programs effectively
- Understand the relationship between memory order and memory barriers
- Familiarize yourself with the performance implications of different data structures and organizations
- Assess the performance impact of concurrent memory accessed and how to minimize it
- Discover when to use and when not to use lock-free programming techniques
- Explore different ways to improve the effectiveness of compiler optimizations
- Design APIs for concurrent data structures and high-performance data structures to avoid inefficiencies

Who this book is for This book is for experienced developers and programmers who work on performance-critical projects and want to learn new techniques to improve the performance of their code. Programmers in algorithmic trading, gaming, bioinformatics, computational genomics, or computational fluid dynamics communities will get the most out of the examples in this book, but the techniques are fairly universal. Although this book uses the C++ language, the concepts demonstrated in the book can be easily transferred or applied to other compiled languages such as C, Java, Rust,

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Go, and more.

Describes the concepts of programming with Linux, covering such topics as shell programming, file structure, managing memory, using MySQL, debugging, processes and signals, and GNOME.

Offers a comprehensive view of the underpinnings of the Linux kernel on the Intel x86 and the Power PC.

Presents an overview of kernel configuration and building for version 2.6 of the Linux kernel.

Git Essentials

Advanced Programming for Performance Analysis and Networking

Beginning Linux?Programming

Linux Kernel Internals

Enterprise and the Cloud

The Linux Kernel Book

Summary: The Linux Kernel Book allows you to delve into the heart of this operating system by means of an in-depth treatment of the internal functioning of the kernel. Each chapter deals in detail with the system components, including: process management, memory management, IPC Systems V, signals, pipes, POSIX tty, file systems, loadable modules, and administration.

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"Large-scale enterprise, cloud, and virtualized computing systems have introduced serious performance challenges. Now, internationally renowned performance expert Brendan Gregg has brought together proven methodologies, tools, and metrics for analyzing and tuning even the most complex environments. *Systems Performance: Enterprise and the Cloud* focuses on Linux® and Unix® performance, while illuminating performance issues that are relevant to all operating systems. You'll gain deep insight into how systems work and perform, and learn methodologies for analyzing and improving system and application performance. Gregg presents examples from bare-metal systems and virtualized cloud tenants running Linux-based Ubuntu®, Fedora®, CentOS, and the illumos-based Joyent® SmartOSTM and OmniTI OmniOS®. He systematically covers modern systems performance, including the "traditional" analysis of CPUs, memory, disks, and networks, and new areas including cloud computing and dynamic tracing. This book also helps you identify and fix the "unknown unknowns" of complex performance: bottlenecks that emerge from elements and interactions you were not aware of. The text concludes with a detailed case study, showing how a real cloud customer issue was analyzed from start to finish."--Back cover.

The Art of Linux Kernel Design Illustrating the Operating System Design Principle and Implementation CRC Press

Discover how to write high-quality character driver code, interface with userspace, work with chip memory, and gain an in-depth understanding of working with hardware interrupts and kernel synchronization Key Features Delve into hardware

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interrupt handling, threaded IRQs, tasklets, softirqs, and understand which to use when. Explore powerful techniques to perform user-kernel interfacing, peripheral I/O and use kernel mechanisms. Work with key kernel synchronization primitives to solve kernel concurrency issues. **Book Description** Linux Kernel Programming Part 2 - Char Device Drivers and Kernel Synchronization is an ideal companion guide to the Linux Kernel Programming book. This book provides a comprehensive introduction for those new to Linux device driver development and will have you up and running with writing misc class character device driver code (on the 5.4 LTS Linux kernel) in next to no time. You'll begin by learning how to write a simple and complete misc class character driver before interfacing your driver with user-mode processes via procfs, sysfs, debugfs, netlink sockets, and ioctl. You'll then find out how to work with hardware I/O memory. The book covers working with hardware interrupts in depth and helps you understand interrupt request (IRQ) allocation, threaded IRQ handlers, tasklets, and softirqs. You'll also explore the practical usage of useful kernel mechanisms, setting up delays, timers, kernel threads, and workqueues. Finally, you'll discover how to deal with the complexity of kernel synchronization with locking technologies (mutexes, spinlocks, and atomic/refcount operators), including more advanced topics such as cache effects, a primer on lock-free techniques, deadlock avoidance (with lockdep), and kernel lock debugging techniques. By the end of this Linux kernel book, you'll have learned the fundamentals of writing Linux character device driver code for real-world projects and products. What you will learn. Get to grips with the basics of the modern Linux

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Device Model (LDM) Write a simple yet complete misc class character device driver Perform user-kernel interfacing using popular methods Understand and handle hardware interrupts confidently Perform I/O on peripheral hardware chip memory Explore kernel APIs to work with delays, timers, kthreads, and workqueues Understand kernel concurrency issues Work with key kernel synchronization primitives and discover how to detect and avoid deadlock Who this book is for An understanding of the topics covered in the Linux Kernel Programming book is highly recommended to make the most of this book. This book is for Linux programmers beginning to find their way with device driver development. Linux device driver developers looking to overcome frequent and common kernel/driver development issues, as well as perform common driver tasks such as user-kernel interfaces, performing peripheral I/O, handling hardware interrupts, and dealing with concurrency will benefit from this book. A basic understanding of Linux kernel internals (and common APIs), kernel module development, and C programming is required.

Linux Kernel Networking

BPF Performance Tools

Attacking the Core

The Art of Linux Kernel Design

Implementation and Theory

A Practical Real-World Approach

The IA-64 Linux kernel makes extraordinary power available to every Linux

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developer. In IA-64 Linux Kernel: Design and Implementation, the kernel project's leaders systematically present every major subsystem, introducing interfaces used by Linux to abstract platform differences, showing how these interfaces are used in IA-64, and illuminating key issues associated with Linux kernel operation on any platform. Covers processes, tasks, threads, virtual memory, I/O, symmetric multiprocessing, bootstrapping, and more.

Is Parallel Programming Hard

Linux Kernel Development

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Linux Observability with BPF