
Understanding The Linux Kernel

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Understanding The Linux Kernel
by Garrett & Kirsten*

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Understanding the Linux Kernel "O'Reilly Media, Inc."

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 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 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.

Understanding the Linux Kernel

From I/O Ports to Process Management

"O'Reilly Media, Inc."

In order to thoroughly understand what makes Linux tick and why it works so well on a wide variety of systems, you need to delve deep into the

heart of the kernel. The kernel handles all interactions between the CPU and the external world, and determines which programs will share processor time, in what order. It manages limited memory so well that hundreds of processes can share the system efficiently, and expertly organizes data transfers so that the CPU isn't kept waiting any longer than necessary for the relatively slow disks. The third edition of *Understanding the Linux Kernel* takes you on a guided tour of the most significant data structures, algorithms, and programming tricks used in the kernel. Probing beyond superficial features, the authors offer valuable insights to people who want to know how things really work inside their machine. Important Intel-specific features are discussed. Relevant segments of code are dissected line by line. But the book covers more than just the functioning of the code; it explains the theoretical underpinnings of why Linux does things the way it does. This edition of the book covers Version 2.6, which has seen significant changes to nearly every kernel subsystem, particularly in the areas of memory management and block devices. The book focuses on the following topics: Memory management, including file buffering, process swapping, and Direct memory Access (DMA) The Virtual Filesystem layer and

the Second and Third Extended Filesystems Process creation and scheduling Signals, interrupts, and the essential interfaces to device drivers Timing Synchronization within the kernel Interprocess Communication (IPC) Program execution Understanding the Linux Kernel will acquaint you with all the inner workings of Linux, but it's more than just an academic exercise. You'll learn what conditions bring out Linux's 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. This book will help you make the most of your

Linux system.

Understanding The Linux Kernel, 3E (Covers Version 2.6)

In order to thoroughly understand what makes Linux tick and why it works so well on a wide variety of systems, you need to delve deep into the heart of the kernel. The kernel handles all interactions between the CPU and the external world, and determines which programs will share processor time, in what order. It manages limited memory so well that hundreds of processes can share the system efficiently, and expertly organizes data transfers so that the CPU isn't kept waiting any longer than absolutely necessary for the relatively slow disks.

Understanding Linux Network Internals

"O'Reilly Media, Inc."

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.

Linux Kernel Programming**A comprehensive guide to kernel internals, writing kernel modules, and kernel synchronization**

Packt Publishing Ltd

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 be confident that your knowledge will continue to be valid for years to come. This Linux book begins by showing you how to build the kernel from the source. Next, you'll learn how to write your first kernel module using the powerful Loadable Kernel Module (LKM) framework. The book then covers key kernel internals topics including Linux kernel architecture, memory management, and CPU scheduling. Next, 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 learn Write high-quality modular kernel code (LKM framework) for 5.x kernels Configure and build a kernel from source Explore the Linux kernel architecture Get to

grips with key internals regarding memory management within the kernel Understand and work with various dynamic kernel memory alloc/dealloc APIs Discover key internals aspects regarding CPU scheduling within the kernel Gain an understanding of kernel concurrency issues Find out how to work with key kernel synchronization primitives Who this book is for This book is for Linux programmers beginning to find their way with Linux kernel development. Linux kernel and driver developers looking to overcome frequent and common kernel development issues, as well as understand kernel internals, will benefit from this book. A basic understanding

of Linux CLI and C programming is required.

Professional Linux Kernel Architecture

John Wiley & Sons

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.

Understanding the Linux Virtual Memory Manager
Prentice-Hall PTR

This is an expert guide to the 2.6 Linux Kernel's most important component: the Virtual Memory Manager.

Linux Kernel Development
Pearson Education India

The Linux Kernel Book

John Wiley & Sons Incorporated

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.

Linux Kernel in a Nutshell
"O'Reilly Media, Inc."

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

The Linux Kernel Primer

A Top-down Approach for X86 and PowerPC Architectures
Prentice Hall

Offers a comprehensive view of the underpinnings of

the Linux kernel on the Intel x86 and the Power PC.

Linux Device Drivers

"O'Reilly Media, Inc."

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

Linux System Programming

Talking Directly to the Kernel and C Library *"O'Reilly Media, Inc."*

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 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.

Linux Kernel Networking

Implementation and Theory *Apress*

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

Linux networking implementation and the 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.

Linux in a Nutshell

"O'Reilly Media, Inc."

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

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, 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.

Linux Kernel Internals Addison-Wesley Professional

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 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.
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1

Mastering Linux Kernel Development

A kernel developer's

reference manual

Packt Publishing Ltd

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 files—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.

UX for Beginners

A Crash Course in 100 Short Lessons

"O'Reilly Media, Inc."

Apps! Websites! Rubber Ducks! Naked Ninjas! This book has everything. If you want to get started in user experience design (UX), you've come to the right place: 100 self-contained lessons that cover the whole spectrum of fundamentals. Forget dry, technical material. This book—based on the wildly popular UX Crash Course from Joel Marsh's blog *The Hipper Element*—is laced with the author's snarky brand of humor, and teaches UX in a simple, practical way. Becoming a professional doesn't have to be boring. Follow the real-life UX process from start-to-

finish and apply the skills as you learn, or refresh your memory before the next meeting. UX for Beginners is perfect for non-designers who want to become designers, managers who teach UX, and programmers, salespeople, or marketers who want to learn more. Start from scratch: the fundamentals of UX Research the weird and wonderful things users do The process and science of making anything user-friendly Use size, color, and layout to help and influence users Plan and create wireframes Make your designs feel engaging and persuasive Measure how your design works in the real world Find out what a UX designer does all day

Understanding the Linux Kernel, Second Edition

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 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 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.

Linux with Operating System Concepts
CRC Press

A True Textbook for an Introductory Course, System Administration Course, or a Combination Course
 Linux with Operating

System Concepts, Second Edition merges conceptual operating system (OS) and Unix/Linux topics into one cohesive textbook for undergraduate students. The book can be used for a one- or two-semester course on Linux or Unix. It is complete with review sections, problems, definitions, concepts and relevant introductory material, such as binary and Boolean logic, OS kernels and the role of the CPU and memory hierarchy. Details for Introductory and Advanced Users
 The book covers Linux from both the user and system administrator positions. From a user perspective, it emphasizes command-line interaction. From a system administrator perspective, the text

reinforces shell scripting with examples of administration scripts that support the automation of administrator tasks. Thorough Coverage of Concepts and Linux Commands The author incorporates OS concepts not found in most Linux/Unix textbooks, including kernels, file systems, storage devices, virtual memory and process management. He also introduces computer science topics, such as computer networks and TCP/IP, interpreters versus compilers, file compression, file system integrity through backups, RAID and encryption technologies, booting and the GNUs C compiler. New in this Edition The book has

been updated to systemd Linux and the newer services like Cockpit, NetworkManager, firewalld and journald. This edition explores Linux beyond CentOS/Red Hat by adding detail on Debian distributions. Content across most topics has been updated and improved.

Linux Internals Simplified

A Beginners Guide to Linux Internals

"Linux internals simplified" is a book which discusses the basics of Linux kernel internals in a code driven approach. It picks the major subsystems of the kernel which are important, and tries to simplify its internal working and data

structures. As such, this book is aimed at engineers who wish to start learning about the Linux kernel. This book starts with the basic steps to acquire the Linux kernel code. It then shows ways of customizing the build options and lastly kernel compilation. Next it looks at a number of hacking tools which will help one to debug and trace in a live Linux system. Practical examples of ftrace, kprobes and crash tool are discussed. These tools are useful in trying to understand the way the Linux system works. Chapter 3 discusses the details of a running process in a Linux system. It touches topics such as address spaces of a running process, user and kernel spaces, system calls, Linux process descriptor, Linux process creation, and so on. This chapter builds a foundation of a program in execution in the Linux system. Once the reader knows about the running processes, chapter 4 discusses about the Linux process scheduling subsystem. This chapter discusses different data structures and code paths of the Linux scheduler, which controls the scheduling of processes in the Linux system. Chapter 5 discusses Interrupts, which play a significant role in the Linux operating system. The chapter discusses edge and level triggered interrupts, interrupt handlers and their registration, shared interrupt handlers, and

so on. It also shows the ftrace of the `do_irq` function. Chapter 6 discusses the signal subsystem. It starts with a little introduction of the design of the signal subsystem. It then traces the code execution of delivering and handling of signals in the Linux kernel. The chapter then discusses signal overloading and how it is performed, while exploring the kernel code which handles this. Chapter 7 covers Linux synchronization primitives, and why they are needed. It shows the detailed implementation of primitives like atomic variables, spinlocks, semaphores and mutexes in the Linux kernel. Chapter 8 discusses various ways of Linux kernel

memory allocation. It discusses Buddy allocator, Resource map allocator and Slab allocator. It discusses various APIs used for these allocators (`alloc_page/s`, `kmem_cache_alloc`, `kmalloc` etc.). It also discusses how user space `malloc` results in memory allocation in the Linux kernel. Chapter 9 discusses the Linux dynamic modules, Linux character driver framework, internal functions which are used while creating a character driver, UDEV events and IOCTL interface. It also discusses Linux device model. It discusses example of bus, device and device_driver components. It illustrates device model when used in PCI BUS. Chapter 10

covers the subsystem related to block IOs. It starts with an introduction of filesystem and its purpose. It then traces the path an IO takes, right from the "write()" system call, to the moment it gets written to the disk. The chapter covers basic data structures and design elements while going down the IO stack.

Systems Performance

Enterprise and the Cloud *Pearson Education*

"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.

Linux Kernel Programming Part 2 - Char Device

Drivers and Kernel Synchronization

Create user-kernel interfaces, work with peripheral I/O, and handle hardware interrupts

Packt Publishing Ltd

This book follows on from Linux Kernel Programming, helping you explore the Linux character device driver framework and enables you to write 'misc' class drivers. You'll learn how to efficiently interface with user apps, perform I/O on hardware memory, handle hardware interrupts, and leverage kernel delays, timers, kthreads, and workqueues.

Linux Core Kernel Commentary *Coriolis Group*

Disc contains:
linux-0.01 -- linux-2.4.1

-- linux-2.4.5 -- Tags
files for all included
kernel distributions --
lkc_code -- lkc-find-
line.el -- Cross-
reference listing for
lkc_code.

Linux Pocket Guide *"O'Reilly Media, Inc."*

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reputation as
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comprehensive, and
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the fluff. Every page of
Linux Pocket Guide
lives up to this billing.
It clearly explains how
to get up to speed
quickly on day-to-day
Linux use. Once you're
up and running, Linux
Pocket Guide provides
an easy-to-use
reference that you can
keep by your keyboard
for those times when
you want a fast, useful
answer, not hours in

the man pages. Linux
Pocket Guide is
organized the way you
use Linux: by function,
not just alphabetically.
It's not the 'bible of
Linux; it's a practical
and concise guide to
the options and
commands you need
most. It starts with
general concepts like
files and directories,
the shell, and X
windows, and then
presents detailed
overviews of the most
essential commands,
with clear examples.
You'll learn each
command's purpose,
usage, options,
location on disk, and
even the RPM package
that installed it. The
Linux Pocket Guide is
tailored to Fedora
Linux--the latest spin-
off of Red Hat Linux--
but most of the
information applies to
any Linux

system. Throw in a host of valuable power user tips and a friendly and accessible style, and you'll quickly find this practical, to-the-point book a small but mighty resource for Linux users.

Linux Kernel Development *Pearson Education*

The authoritative guide to the latest Linux kernel: fully updated, with an all-new chapter on kernel data structures. * Authored by a well-known member of the Linux kernel development team with a reputation for clarity, readability, and insight. * Covers all major subsystems and features of the latest version of the Linux 2.6.xx kernel. * Provides examples based on real kernel code: samples that

developers can use to modify and improve the Linux kernel on their own. Linux Kernel Development, 3/e, is a start-to-finish guide to the design and implementation of the latest Linux 2.6.xx kernel, written specifically for programmers who want to understand the existing kernel, write new kernel code, and write software that relies on the kernel's behavior. Author Robert Love is respected worldwide for his contributions to the Linux kernel: contributions that have improved everything from Linux preemption and process scheduling to virtual memory. In this book, he illuminates every major subsystem and feature of the current Linux kernel: their purpose,

goals, design, implementation, and programming interfaces. He covers the kernel both from a theoretical and applied standpoint, helping programmers gain deep insights into operating system design as they master the skills of writing Linux kernel code. Love covers all important algorithms, relevant subsystems, process management, scheduling, time management and timers, system call interface, memory addressing, memory management, paging strategies, caching layers, VFS, kernel synchronization, signals, and more. This edition has been updated throughout to reflect changes since the original Linux kernel 2.6 was

released. It also contains an entirely new chapter on kernel data structures.

The Linux Command Line, 2nd Edition

A Complete Introduction No Starch Press

You've experienced the shiny, point-and-click surface of your Linux computer--now dive below and explore its depths with the power of the command line. The Linux Command Line takes you from your very first terminal keystrokes to writing full programs in Bash, the most popular Linux shell (or command line). Along the way you'll learn the timeless skills handed down by generations of experienced, mouse-shunning gurus: file navigation,

environment configuration, command chaining, pattern matching with regular expressions, and more. In addition to that practical knowledge, author William Shotts reveals the philosophy behind these tools and the rich heritage that your desktop Linux machine has inherited from Unix supercomputers of yore. As you make your way through the book's short, easily-digestible chapters, you'll learn how to:

- Create and delete files, directories, and symlinks
- Administer your system, including networking, package installation, and process management
- Use standard input and output, redirection, and pipelines
- Edit files with Vi, the world's most popular text

editor

- Write shell scripts to automate common or boring tasks
- Slice and dice text files with cut, paste, grep, patch, and sed

Once you overcome your initial "shell shock," you'll find that the command line is a natural and expressive way to communicate with your computer. Just don't be surprised if your mouse starts to gather dust.

Understanding the Linux Kernel

"Linux 2.4"--p. ix

Hands-On System Programming with Linux

Explore Linux system programming interfaces, theory, and practice *Packt Publishing Ltd*

Twenty five years ago, as often happens in our industry, pundits laughed at and called Linux a joke. To say that view has changed is a massive understatement. This book will cement for you both the conceptual 'why' and the practical 'how' of systems programming on Linux, and covers Linux systems programming on the latest 4.x kernels.

Essential System Administration

Tools and Techniques for Linux and Unix Administration

"O'Reilly Media, Inc."

Essential System Administration, 3rd Edition is the definitive guide for Unix system administration, covering all the

fundamental and essential tasks required to run such divergent Unix systems as AIX, FreeBSD, HP-UX, Linux, Solaris, Tru64 and more. Essential System Administration provides a clear, concise, practical guide to the real-world issues that anyone responsible for a Unix system faces daily. The new edition of this indispensable reference has been fully updated for all the latest operating systems. Even more importantly, it has been extensively revised and expanded to consider the current system administrative topics that administrators need most. Essential System Administration, 3rd Edition covers: DHCP, USB devices, the latest

automation tools, SNMP and network management, LDAP, PAM, and recent security tools and techniques. Essential System Administration is comprehensive. But what has made this book the guide system administrators turn to over and over again is not just the sheer volume of valuable information it provides, but the clear, useful way the information is presented. It discusses the underlying higher-level concepts, but it also provides the details of the procedures needed to carry them out. It is not organized around the features of the Unix operating system, but around the various facets of a system administrator's job. It describes all the usual administrative tools

that Unix provides, but it also shows how to use them intelligently and efficiently. Whether you use a standalone Unix system, routinely provide administrative support for a larger shared system, or just want an understanding of basic administrative functions, Essential System Administration is for you. This comprehensive and invaluable book combines the author's years of practical experience with technical expertise to help you manage Unix systems as productively and painlessly as possible.

Operating Systems

Three Easy Pieces

Createspace

Independent Publishing Platform

"This book is organized

around three concepts fundamental to OS construction: virtualization (of CPU and memory), concurrency (locks and condition variables), and persistence (disks, RAIDS, and file systems"--Back cover.

Understanding The Linux Kernel

Mastering Embedded Linux Programming *Packt Publishing Ltd*

Master the techniques needed to build great, efficient embedded devices on Linux About This Book Discover how to build and configure reliable embedded Linux devices This book has been updated to include Linux 4.9 and Yocto Project 2.2 (Morty) This comprehensive guide

covers the remote update of devices in the field and power management Who This Book Is For If you are an engineer who wishes to understand and use Linux in embedded devices, this book is for you. It is also for Linux developers and system programmers who are familiar with embedded systems and want to learn and program the best in class devices. It is appropriate for students studying embedded techniques, for developers implementing embedded Linux devices, and engineers supporting existing Linux devices. 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` Find out how to configure Linux as a real-time operating system In Detail Embedded 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. The comprehensive guide shows you the technologies and techniques required to build Linux into embedded systems. 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. Style

and approach This book is an easy-to-follow and pragmatic guide with in-depth analysis of the implementation of embedded devices. It follows the life cycle of a project from inception through to completion, at each stage giving both the theory that underlies the topic and practical step-by-step walkthroughs of an example implementation.

Linux

Linux Command Line, Cover All Essential Linux Commands.: A Beginner's Guide *CreateSpace*

This book is a beginner's guide for fast learning Linux commands which are frequently used by

Linux administrators or beginners. The book covers all essential Linux commands as well as their operations, examples and explanations. It also includes Linux Helping commands, symbols, shortcut keys, run levels and Vi commands. From this book, you can easily learn: How to run all essential Linux commands. How to copy, move, and delete files and directories. How to create, remove, and manage users and groups. How to access Linux server, and use SSH commands. How to operate the run levels and change the run levels. How to navigate at the command line by helping commands. How to compare files, find out a file, manipulate file

contents. How to start a job, stop a job and schedule a job. How to manage permissions, ownership of files, directories. How to connect across network, communicate with network. How to transfer files over network, send network messages And much more skill..... There is a long chart containing all common Linux commands in this book, which can give you a great help in your job or study. You can learn all essential Linux commands quickly.

Cloud Computing

Concepts, Technology & Architecture *Pearson Education*

Explores cloud computing, breaking down the concepts,

models, mechanisms, and architectures of this technology while allowing for the financial assessment of resources and how they compare to traditional storage systems.

The Design of the UNIX Operating System

This book describes the internal algorithms and the structures that form the basis of the UNIX operating system and their relationship to the programmer interface. The system description is based on UNIX System V Release 2 supported by AT&T, with some features from Release 3.

Linux Device Drivers Development

Develop customized drivers for

embedded Linux

Packt Publishing Ltd

Learn to develop customized device drivers for your embedded Linux system About This Book Learn to develop customized Linux device drivers Learn the core concepts of device drivers such as memory management, kernel caching, advanced IRQ management, and so on. Practical experience on the embedded side of Linux Who This Book Is For This book will help anyone who wants to get started with developing their own Linux device drivers for embedded systems. Embedded Linux users will benefit highly from this book. This book covers all about device driver development, from char drivers to

network device drivers to memory management. What You Will Learn Use kernel facilities to develop powerful drivers Develop drivers for widely used I2C and SPI devices and use the regmap API Write and support devicetree from within your drivers Program advanced drivers for network and frame buffer devices Delve into the Linux irqdomain API and write interrupt controller drivers Enhance your skills with regulator and PWM frameworks Develop measurement system drivers with IIO framework Get the best from memory management and the DMA subsystem Access and manage GPIO subsystems and develop GPIO controller

drivers In Detail Linux kernel is a complex, portable, modular and widely used piece of software, running on around 80% of servers and embedded systems in more than half of devices throughout the World. Device drivers play a critical role in how well a Linux system performs. As Linux has turned out to be one of the most popular operating systems used, the interest in developing proprietary device drivers is also increasing steadily. This book will initially help you understand the basics of drivers as well as prepare for the long journey through the Linux Kernel. This book then covers drivers development based on various Linux subsystems such as memory management,

PWM, RTC, IIO, IRQ management, and so on. The book also offers a practical approach on direct memory access and network device drivers. By the end of this book, you will be comfortable with the concept of device driver development and will be in a position to write any device driver from scratch using the latest kernel version (v4.13 at the time of writing this book). Style and approach A set of engaging examples to develop Linux device drivers

Understanding The Linux Kernel

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 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. You'll learn what conditions bring out Linux's best performance, and 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.

Lions' Commentary on UNIX 6th Edition with Source Code
Peer to Peer Communications

For the past 20 years, UNIX insiders have cherished and zealously guarded pirated photocopies of this manuscript, a

"hacker trophy" of sorts. Now legal (and legible) copies are available. An international "who's who" of UNIX wizards, including Dennis Ritchie, have contributed essays extolling the merits and importance of this underground classic.

How Linux Works, 2nd Edition

What Every Superuser Should Know
No Starch Press

Unlike some operating systems, Linux doesn't try to hide the important bits from you—it gives you full control of your computer. But to truly master Linux, you need to understand its internals, like how the system boots, how networking works, and what the kernel

actually does. In this completely revised second edition of the perennial best seller *How Linux Works*, author Brian Ward makes the concepts behind Linux internals accessible to anyone curious about the inner workings of the operating system. Inside, you'll find the kind of knowledge that normally comes from years of experience doing things the hard way. You'll learn:

- How Linux boots, from boot loaders to init implementations (systemd, Upstart, and System V)
- How the kernel manages devices, device drivers, and processes
- How networking, interfaces, firewalls, and servers work
- How development tools work and relate to shared libraries
- How to write effective shell scripts
- You'll also explore the kernel and examine key system tasks inside user space, including system calls, input and output, and filesystems.

With its combination of background, theory, real-world examples, and patient explanations, *How Linux Works* will teach you what you need to know to solve pesky problems and take control of your operating system.