Linux
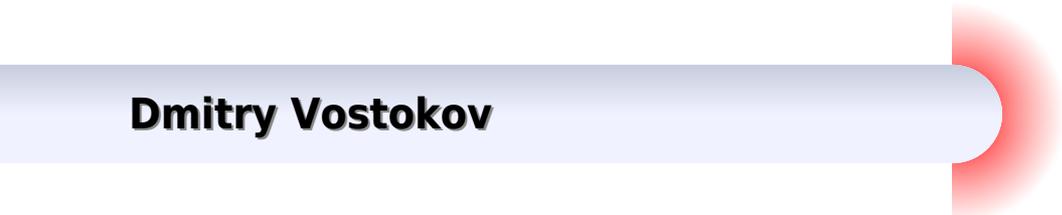# Kernel Debugging

Leverage proven tools and advanced techniques to effectively debug
Linux kernels and kernel modules

Kaiwan N Billimoria

[The Linux Kernel Debugging Computer Science](#)

Dmitry Vostokov

The Linux Kernel Debugging Computer Science:

  Linux Kernel Debugging Kaiwan N. Billimoria,2022-08-05 Effectively debug kernel modules device drivers and the kernel itself by gaining a solid understanding of powerful open source tools and advanced kernel debugging techniques Key Features Fully understand how to use a variety of kernel and module debugging tools and techniques using examples Learn to expertly interpret a kernel Oops and identify underlying defect s Use easy to look up tables and clear explanations of kernel level defects to make this complex topic easy Book DescriptionThe Linux kernel is at the very core of arguably the world s best production quality OS Debugging it though can be a complex endeavor Linux Kernel Debugging is a comprehensive guide to learning all about advanced kernel debugging This book covers many areas in depth such as instrumentation based debugging techniques printk and the dynamic debug framework and shows you how to use Kprobes Memory related bugs tend to be a nightmare two chapters are packed with tools and techniques devoted to debugging them When the kernel gifts you an Oops how exactly do you interpret it to be able to debug the underlying issue We ve got you covered Concurrency tends to be an inherently complex topic so a chapter on lock debugging will help you to learn precisely what data races are including using KCSAN to detect them Some thorny issues both debug and performance wise require detailed kernel level tracing you ll learn to wield the impressive power of Ftrace and its frontends You ll also discover how to handle kernel lockups hangs and the dreaded kernel panic as well as leverage the venerable GDB tool within the kernel KGDB along with much more By the end of this book you will have at your disposal a wide range of powerful kernel debugging tools and techniques along with a keen sense of when to use which What you will learn Explore instrumentation based printk along with the powerful dynamic debug framework Use static and dynamic Kprobes to trap into kernel module functions Catch kernel memory defects with KASAN UBSAN SLUB debug and kmemleak Interpret an Oops in depth and precisely identify it s source location Understand data races and use KCSAN to catch evasive concurrency defects Leverage Ftrace and trace cmd to trace the kernel flow in great detail Write a custom kernel panic handler and detect kernel lockups and hangs Use KGDB to single step and debug kernel module source code Who this book is for This book is for Linux kernel developers module driver authors and testers interested in debugging and enhancing their Linux systems at the level of the kernel System administrators who want to understand and debug the internal infrastructure of their Linux kernels will also find this book useful A good grasp on C programming and the Linux command line is necessary Some experience with kernel module development will help you follow along   Linux Kernel Development Robert Love,2010-06-22 Linux Kernel Development details the design and implementation of the Linux kernel presenting the content in a manner that is beneficial to those writing and developing kernel code as well as to programmers seeking to better understand the operating system and become more efficient and productive in their coding The book details the major subsystems and features of the Linux kernel including its design implementation and interfaces It covers the Linux kernel with both a practical and theoretical eye

which should appeal to readers with a variety of interests and needs The author a core kernel developer shares valuable knowledge and experience on the 2 6 Linux kernel Specific topics covered include process management scheduling time management and timers the system call interface memory addressing memory management the page cache the VFS kernel synchronization portability concerns and debugging techniques This book covers the most interesting features of the Linux 2 6 kernel including the CFS scheduler preemptive kernel block I O layer and I O schedulers The third edition of Linux Kernel Development includes new and updated material throughout the book An all new chapter on kernel data structures Details on interrupt handlers and bottom halves Extended coverage of virtual memory and memory allocation Tips on debugging the Linux kernel In depth coverage of kernel synchronization and locking Useful insight into submitting kernel patches and working with the Linux kernel community   The Linux Kernel Primer Claudia Salzberg Rodriguez,Claudia Salzberg,Gordon Fischer,Steven Smolski,2006 Offers a comprehensive view of the underpinnings of the Linux kernel on the Intel x86 and the Power PC   **Memory Dump Analysis Anthology** Dmitry Vostokov,2008-04 This revised cross referenced and thematically organized volume of selected DumpAnalysis org blog posts targets software engineers developing and maintaining products on Windows platforms technical support and escalation engineers   **The Proceedings of the Thirtieth SIGCSE Technical Symposium on Computer Science Education** Jane Prey,SIGCSE99: The 30th ACM SIGCSE Technical Symposium,1999   The Proceedings of the Thirtieth SIGCSE Technical Symposium on Computer Science Education Daniel T. Joyce,1999   *Computerworld* ,2005-07-18 For more than 40 years Computerworld has been the leading source of technology news and information for IT influencers worldwide Computerworld s award winning Web site Computerworld com twice monthly publication focused conference series and custom research form the hub of the world s largest global IT media network   *Computer Sciences Technical Report* ,2004   Algorithms and Architectures for Parallel Processing Ting Hu,Feng Wang,Hongwei Li,Qian Wang,2018-12-29 This book constitutes the workshop proceedings of the 18th International Conference on Algorithms and Architectures for Parallel Processing ICA3PP 2018 held in Guangzhou China in November 2018 The 24 full papers presented were carefully selected and reviewed from numerous submissions to the two following workshops ICA3PP 2018 Workshop on Intelligent Algorithms for Large scale Complex Optimization Problems ICA3PP 2018 Workshop on Security and Privacy in Data Processing   **Linux Journal** ,2005-07   **Information Security** Colin Boyd,Wenbo Mao,2003-12-12 The 2003 Information Security Conference was the sixth in a series that started with the InformationSecurity Workshopin 1997 A distinct feature of this series is the wide coverage of topics with the aim of encouraging interaction between researchers in di erent aspects of information security This trend continued in the program of this year s conference There were 133 paper submissions to ISC 2003 From these submissions the 31papersintheseproceedingswereselectedbytheprogramcommittee covering a wide range of technical areas These papers are supplemented by two invited papers athirdinvitedtalkwaspresentedattheconferencebutisnotrepresented by a written paper

We would like to extend our sincere thanks to all the authors that submitted papers to ISC 2003 and we hope that those whose papers were declined will be able to nd an alternative forum for their work We are also very grateful to the three eminent invited speakers at the conference Paul van Oorschot Carleton University Canada Ueli Maurer ETH Zur ich Switzerland and Andy Clark Inforenz Limited UK We were fortunate to have an energetic team of experts who took onthe task of the program committee Their names may be found overleaf and we thank them warmly for their considerable e orts This team was helped by an even larger number of individuals who reviewed papers in their particular areas of expertise A list of these names is also provided which we hope is complete *InfoWorld* ,2003-06-02 InfoWorld is targeted to Senior IT professionals Content is segmented into Channels and Topic Centers InfoWorld also celebrates people companies and projects __Linux System Programming__ Robert Love,2007-11-15 This book is about writing software that makes the most effective use of the system you re running on code that interfaces directly with the kernel and core system libraries including the shell text editor compiler debugger core utilities and system daemons The majority of both Unix and Linux code is still written at the system level and Linux System Programming focuses 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 better at the low level this book is an ideal teaching tool for any programmer Even with the trend toward high level development either through web software such as PHP or managed code C someone still has to write the PHP interpreter and the C virtual machine Linux System Programming gives you an understanding of core internals that makes for better code no matter where it appears in the stack Debugging high level code often requires you to understand the system calls and kernel behavior of your operating system too Key topics include An overview of Linux the kernel the C library and the C compiler Reading from and writing to files along with other basic file I O operations including how the Linux kernel implements and manages file I O Buffer size management including the Standard I O library Advanced I O interfaces memory mappings and optimization techniques The family of system calls for basic process management Advanced process management including real time processes File and directories creating moving copying deleting and managing them Memory management interfaces for allocating memory managing the memory you have and optimizing your memory access Signals and their role on a Unix system plus basic and advanced signal interfaces Time sleeping and clock management starting with the basics and continuing through POSIX clocks and high resolution timers With Linux System Programming you will be able to take an in depth look at Linux from both a theoretical and an applied perspective as you cover a wide range of programming topics __User Mode Linux__ Jeff Dike,2006 With User Mode Linux you can create virtual Linux machines within a Linux computer and use them to test and debug applications network services and even kernels This work covers almost everything from getting started through running enterprise class User Mode Linux servers It offers advice on bootup compilation administration and more **Linux NFS and Automounter Administration** Erez Zadok,2001 The Craig Hunt Linux Library

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