



## Who This Book Is For

This book is intended to cover everything that is needed to know in order to properly build, customize, and install the Linux kernel. No programming experience is needed to understand and use this book.

Some familiarity with how to use Linux, and some basic command-line usage is expected of the reader.

This book is not intended to go into the programming aspects of the Linux kernel; there are many other good books listed in the Bibliography that already cover this topic.

## How the Book Is Organized

This book is organized into four parts.

Part I, *Building the Kernel*, includes Chapters 1 through 6, which cover everything you need to know about retrieving, building, installing, and upgrading the Linux kernel, in more or less step-by-step fashion.

### Chapter 1, *Introduction*

This chapter explains when and why you would want to build the kernel.

### Chapter 2, *Requirements for Building and Using the Kernel*

This chapter covers the different programs and tools that are needed in order to properly build the kernel. It also covers a number of different programs that are tied very closely to the kernel, how to determine the needed version of the programs, and where to find them.

### Chapter 3, *Retrieving the Kernel Source*

This chapter discusses how the different Linux kernel versions relate to each other, where to retrieve the Linux kernel source code, and how to download it properly.

### Chapter 4, *Configuring and Building*

This chapter explains how to configure and properly build the Linux kernel.

### Chapter 5, *Installing and Booting from a Kernel*

This chapter shows how to install the kernel that has been built properly, and then boot into that kernel version.

### Chapter 6, *Upgrading a Kernel*

This chapter explains how to upgrade a kernel that was previously built to a newer version without having to start over from nothing.

Part II, *Major Customizations*, consists of Chapters 7 and 8, which describe how to properly configure the kernel based on the hardware present in the system, and provides a number of different “recipes” for common configurations.

### Chapter 7, *Customizing a Kernel*

This chapter discusses how to customize the kernel for the hardware that is present on the system. It goes over a variety of different ways to determine

what options should be selected and provides some simple scripts to help with the task.

#### Chapter 8, *Kernel Configuration Recipes*

This chapter explains how to configure the kernel for a variety of common situations.

Part III, *Kernel Reference*, consists of Chapters 9 through 11. These chapters provide a reference to the different kernel command line options, the kernel build options, and a select few of the different kernel configuration options.

#### Chapter 9, *Kernel Boot Command-Line Parameter Reference*

This chapter details all of the different command-line options that can be passed to the kernel, and what the different options do.

#### Chapter 10, *Kernel Build Command-Line Reference*

This chapter describes the different command line options that are available when building the kernel and how to use them.

#### Chapter 11, *Kernel Configuration Option Reference*

This chapter focuses on a few of the more popular and important Linux kernel configuration options.

#### Part IV, *Additional Information*

#### Appendix A, *Helpful Utilities*

This chapter introduces a number of very good and handy tools that everyone who wishes to track the latest Linux kernel version should use.

#### Appendix B, *Bibliography*

This chapter offers a list of useful references that you can use to track down more information on building your Linux kernel.

## Online Version and License

This book is freely available under the Creative Commons “Attribution-ShareAlike” license, Version 2.5. This license can be seen in its entirety at <http://creativecommons.org/licenses/by-sa/2.5/>. The full book is also available online at <http://www.kroah.com/lkn>.

## Conventions Used in This Book

This book uses the following typographical conventions:

#### *Italic*

Indicates programs, tools, commands and command options, distribution packages, files, directories, usernames, and hostnames. Also indicates nomenclature that we’ve not previously used and emphasized words.

#### Constant Width

Indicates strings used for kernel configuration, as well as a few special terms such as device names. Also used to show command output and the contents of text and program files.

#### Constant Width Bold

Used in examples to indicate commands or other text that should be typed literally by the user.

#### Constant Width Italic

Indicates text that you should replace with your own values; for example, your own name or password. When this appears as part of text that you should type in, it is shown as Constant Width Italic Bold.

#### #, \$

Used in some examples as the root shell prompt (#) and as the user prompt (\$) under the Bourne or bash shell.



Indicates a tip, suggestion, or general note.



Indicates a warning or caution.

## Using Shell Scripts

This book is here to help you get your job done. In general, you may use the shell scripts in this book in your own scripts and documentation. You do not need to contact us for permission. The major scripts can be downloaded from the book's web site on O'Reilly Media, <http://www.oreilly.com/catalog/9780596100797>.

We appreciate, but do not require, attribution. An attribution usually includes the title, author, publisher, and ISBN. For example: "*Linux Kernel in a Nutshell* by Greg Kroah-Hartman. Copyright 2007 O'Reilly Media, Inc., 978-0-596-10079-7."

If you feel your use of code examples falls outside fair use or the permission given above, feel free to contact us at [permissions@oreilly.com](mailto:permissions@oreilly.com).

## Safari<sup>®</sup> Enabled



When you see a Safari<sup>®</sup> enabled icon on the cover of your favorite technology book, that means the book is available online through the O'Reilly Network Safari Bookshelf.

Safari offers a solution that's better than e-books. It's a virtual library that lets you easily search thousands of top tech books, cut and paste code samples, download chapters, and find quick answers when you need the most accurate, current information. Try it free at <http://safari.oreilly.com>.

## How to Contact Us

We have tested and verified all of the information in this book to the best of our ability, but you may find that features have changed (or even that we have made mistakes!). Please let us know about any errors you find, as well as your suggestions for future editions, by writing:

O'Reilly Media, Inc.  
1005 Gravenstein Highway North  
Sebastopol, CA 95472  
800-998-9938 (in the United States or Canada)  
707-829-0515 (international/local)  
707-829-0104 (fax)

You can also send us messages electronically. To be put on the mailing list or request a catalog, send email to:

*[info@oreilly.com](mailto:info@oreilly.com)*

To ask technical questions or comment on the book, send email to:

*[bookquestions@oreilly.com](mailto:bookquestions@oreilly.com)*

We have a web site for the book, where we'll list examples, errata, and any plans for future editions. You can access this page at:

*<http://www.oreilly.com/catalog/9780596100797>*

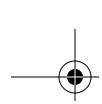
## Acknowledgments

Thanks first go to my wonderful wife Shannon and my beautiful children Madeline and Griffin for their understanding and patience while I took the time to work on this book. Without their support and prodding, this book would have never been completed. Special thanks to Shannon for getting me into Linux kernel development in the first place. Without her effort, I would be still doing some odd embedded programming job, and would have never discovered this great community in which to work in.

My editor, Andy Oram, is the driving force behind this book, shaping it into something that is both readable and informative. His editing skills and patience as deadlines flew by were instrumental in the creation and completion of this book.

Also a big thanks go to the original editor of this book, David Brickner, for giving me the chance to work on this project and believing that I could complete it, despite the first version weighing in at over 1,000 pages.

The technical reviewers for this book were amazing, catching all of the numerous mistakes and pointing out omissions that needed to be filled. The reviewers were (in alphabetic order by first name), Christian Benvenuti, Christian Morgner, Golden G. Richard III, Jean Delvare, Jerry Cooperstein, Michael Boerner, Rik van Riel, and Robert Day. Any remaining problems are due to me, and not their excellent skills.



A special thanks to Randy Dunlap for going over the kernel boot parameters with a fine-tooth comb and pointing out issues in that chapter. Also to Kay Sievers, who helped immensely with all of the chapter on customizing the kernel, and who provided the script at the end of that same chapter. Without his `sysfs` help and knowledge, that chapter would not have been feasible.

And a final special thanks to my sixth grade English teacher, Ms. Gruber, for teaching me that writing was something that was possible to do, and showing me the enjoyment in doing it. Without that start, none of this would have been attainable.

