
Preface

Debian is a very successful operating system, which is pervasive in our digital lives more than people often imagine or are aware of. A few data points will suffice to make this clear. At the time of writing Debian is the most popular GNU/Linux variant among web servers: according to [W3Techs](http://w3techs.com/)¹, more than 10% of the web is Debian-powered. Think about it: how many web sites would have you missed today without Debian? Onto more fascinating deployments, Debian is the operating system of choice on the International Space Station. Have you been following the work of ISS astronauts, maybe via the social network presence of NASA or other international organizations? Both the work in itself and the posts about it have been made possible by Debian. Countless companies, universities, and public administrations rely on Debian daily for their operations, delivering services to millions of users around the world... and its orbit!

But Debian is much more than an operating system, no matter how complex, featureful, and reliable such a system could be. Debian is a vision of the freedoms that people should enjoy in a world where more and more of our daily activities depend on software. Debian is born from the cardinal Free Software idea that people should be in control of their computers, and not the other way around. People with enough software knowledge should be able to dismantle, modify, reassemble and share with others all the software that matters to them. It doesn't matter if the software is used for frivolous activities like posting pictures of kittens on the Web, or for potentially life-threatening tasks such as driving our cars and powering the medical devices which cure us — and Debian is used in all of the above scenarios; you should control it. People without in-depth software knowledge should enjoy those freedoms too: they should be able to delegate to people of their choice, people they trust, the audit or modification of software-based devices on their behalf.

In the quest for the control of people over machines, Free operating systems play a fundamental role: you cannot be in full control of a computer device if you do not control its operating system. This is where Debian's main ambition comes from: producing the best, entirely Free operating system. For more than 20 years now, Debian has both developed a Free operating system and promoted a vision of Free Software around it. In so doing, Debian has set a very high bar for software freedom advocates around the world. Debian's decisions on matters of software licensing, for example, are routinely looked to by international standard organizations, governments, and other Free Software projects, when deciding if something should be considered "free enough" or not.

¹<http://w3techs.com/>

But this political vision is not yet enough to explain Debian's uniqueness. Debian is also a very peculiar social experiment, strongly attached to its independence. Think for a moment of other mainstream Free Software distributions, or even of popular *proprietary* operating systems. Chances are that you can associate each of them with a large company that is either the main development force behind the project, or at the very least the steward of all its non-development activities. Debian is different. Within the Debian Project volunteers pack on themselves the responsibilities of all the activities that are needed to keep Debian alive and kicking. The variety of those activities is stunning: from translations to system administration, from marketing to management, from conference organization to artwork design, from bookkeeping to legal issues... not to mention software packaging and development! Debian contributors take care of all of these.

As a first consequence of this radical form of independence, Debian needs and relies on a very diverse community of volunteers. Any skill in any of the above areas, or others you can imagine, can be invested into Debian and will be used to improve the project. A second consequence of Debian independence is that Debian's choices can be trusted not to be driven by the commercial interests of specific companies — interests that we have no guarantee will always be aligned with the goal of promoting people's control over machines, as too many recent examples in the tech news testify.

One last aspect contributes to Debian's uniqueness: the way in which the social experiment is run. Despite the folklore of being bureaucratic, decision making in Debian is in fact highly distributed. There exist clearly defined areas of responsibility within the project. People in charge of those areas are free to drive their own boat. As long as they keep up with the quality requirements agreed upon by the community, no one can tell them what to do or how to do their job. If you want to have a say on how something is done in Debian, you need to put yourself on the line and be ready to take the job on your shoulders. This peculiar form of meritocracy — which we sometimes call *do-ocracy* — is very empowering for contributors. Anyone with enough skills, time, and motivation can have a real impact on the direction the project is taking. This is testified by a population of about 1 000 official members of the Debian Project, and several thousands of contributors world-wide. It is no wonder that Debian is often credited as the largest community-driven Free Software project in existence.

So Debian is quite unique. Are we the only ones noticing this? Definitely not. According to [DistroWatch](http://distrowatch.com/)² there are about 300 active Free Software distributions around. Half of that (about 140) are Debian *derivatives*. That means that they start from Debian, adapt it to fit the needs of their users — usually by adding, modifying, and rebuilding packages — and release the resulting product. In essence, derivatives apply the Free Software granted freedoms of modifying and redistributing copies not only to individual pieces of software, but to a distribution as a whole. The potential of reaching out to new Free Software users and contributors by the means of derivative distributions is huge. We believe that it is mainly thanks to that thriving ecosystem that Free Software is nowadays finally rivaling with proprietary software in fields which were historically considered hard to conquer, such as large desktop deployments. Debian sits at the root of the largest ecosystem of Free Software distributions in existence: even if you are not

²<http://distrowatch.com/>

using Debian directly, and even if your distributor has not told you, chances are that you are benefiting right now from the work of the Debian community.

But Debian’s uniqueness sometimes comes with unexpected consequences. A consequence of Debian’s vision on digital freedoms has been the need of redefining what we mean by *software*. The Debian Project has since long realized that, as part of an operating system, you need to distribute a lot of non-software material: music, images, documentation, raw data, firmware, etc. But how do you apply *software* freedoms to that material? Should we have different requirements or should all material be held up to the same high standard of freedom? The Debian Project has decided for the latter: all material shipped as part of Debian should offer the same freedoms to its users. Such a radical philosophical position has far reaching effects. It means we cannot distribute non-free firmware, or artwork not meant to be used in commercial settings, or books that cannot be modified in order to avoid tarnishing (as book publishers folklore goes) the author’s/publisher’s reputation.

The book you have in your hands is different. It’s a *free as in freedom* book, a book which is up to Debian freedom standards for every aspect of your digital life. For a very long time, the scarce availability of books like this one has been a significant shortcoming of Debian. It meant that there was little reading material that helped to spread Debian and its values, while at the same time embodying those values and showing off their advantages. But it also meant, ironically, that we had little such material that we could distribute as part of Debian itself. This is the first reputable book to address this shortcoming. You can `apt install` this book, you can re-distribute it, you can fork this book or, better, submit bug reports and patches for it, so that others in the future can benefit from your contributions. The “maintainers” of this book — who are also its authors — are longstanding members of the Debian Project, who grok the freedom ethos that permeates every aspect of Debian and know first-hand what it means to take on the responsibility for important parts of Debian. By releasing this Free book they are doing, once more, such a wonderful service to the Debian community.

We hope you will enjoy this cornerstone of Debian reading Freedom as much as we did.

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Foreword

Linux has been garnering strength for a number of years now, and its growing popularity drives more and more users to make the jump. The first step on that path is to pick a distribution. This is an important decision, because each distribution has its own peculiarities, and future migration costs can be avoided if the right choice is made from the start.

BACK TO BASICS

Linux distribution, Linux kernel

Strictly speaking, Linux is only a kernel, the core piece of software which sits between the hardware and the applications.

A “Linux distribution” is a full operating system; it usually includes the Linux kernel, an installer program, and most importantly applications and other software required to turn a computer into a tool that is actually useful.

Debian GNU/Linux is a “generic” Linux distribution that fits most users. The purpose of this book is to show its many aspects so that you can make an informed decision when choosing.

Why This Book?

CULTURE

Commercial distributions

Most Linux distributions are backed by a for-profit company that develops them and sells them under some kind of commercial scheme. Examples include *Ubuntu*, mainly developed by *Canonical Ltd.*; *Mandriva Linux*, by French company *Mandriva SA*; and *Suse Linux*, maintained and made commercially available by *Novell*.

At the other end of the spectrum lie the likes of Debian and the Apache Software Foundation (which hosts the development for the Apache web server). Debian is above all a project in the Free Software world, implemented by volunteers working together through the Internet. While some of them do work on Debian as part of their paid job in various companies, the project as a whole is not attached to any company in particular, nor does any one company have a greater say in the project’s affairs than what purely volunteer contributors have.

Linux has gathered a fair amount of media coverage over the years; it mostly benefits the distributions supported by a real marketing department — in other words, company-backed distributions (Ubuntu, Red Hat, SUSE, Mandriva, and so on). But Debian is far from being a marginal distribution; multiple studies have shown over the years that it is widely used both on servers and on desktops. This is particularly true among web servers where Debian is the leading Linux distribution.

➡ <http://www.heise.de/open/artikel/Eingesetzte-Produkte-224518.html>

➡ http://w3techs.com/blog/entry/debian_ubuntu_extend_the_dominance_in_the_linux_web_server_market_at_the_expense_of_red_hat_centos

The purpose of this book is to help you discover this distribution. We hope to share the experience that we have gathered since we joined the project as developers and contributors in 1998 (Raphaël) and 2000 (Roland). With any luck, our enthusiasm will be communicative, and maybe you will join us sometime...

The first edition of this book (in 2004) served to fill a gaping hole: it was the first French-language book that focused exclusively on Debian. At that time, many other books were written on the topic both for French-speaking and English-speaking readers. Unfortunately almost none of them got updated, and over the years the situation slipped back to one where there were very few good books on Debian. We hope that this book, which has started a new life with its translation into English (and several translations from English into various other languages), will fill this gap and help many users.

Who Is this Book For?

We tried to make this book useful for many categories of readers. First, systems administrators (both beginners and experienced) will find explanations about the installation and deployment of Debian on many computers. They will also get a glimpse of most of the services available on Debian, along with matching configuration instructions and a description of the specifics coming from the distribution. Understanding the mechanisms involved in Debian's development will enable them to deal with unforeseen problems, knowing that they can always find help within the community.

Users of another Linux distribution, or of another Unix variant, will discover the specifics of Debian, and should become operational very quickly while benefiting fully from the unique advantages of this distribution.

Finally, readers who already have some knowledge of Debian and want to know more about the community behind it should see their expectations fulfilled. This book should make them much closer to joining us as contributors.

General Approach

All of the generic documentation you can find about GNU/Linux also applies to Debian, since Debian includes most common free software. However, the distribution brings many enhancements, which is why we chose to primarily describe the “Debian way” of doing things.

It is interesting to follow the Debian recommendations, but it is even better to understand their rationale. Therefore, we won't restrict ourselves to practical explanations only; we will also describe the project's workings, so as to provide you with comprehensive and consistent knowledge.

Book Structure

This book has its origins in French publisher Eyrolles’ “Administrator’s Handbook” collection, and keeps the same approach of revolving around a case study providing both support and illustration for all topics being addressed.

NOTE

Web site, authors’ email

This book has its own website, which hosts whatever elements that can make it more useful. In particular, it includes an online version of the book with clickable links, and possible errata. Feel free to browse it and to leave us some feedback. We will be happy to read your comments or support messages. Send them by email to hertzog@debian.org (Raphaël) and lolando@debian.org (Roland).

➡ <http://debian-handbook.info/>

Chapter 1 focuses on a non-technical presentation of the Debian project and describes its goals and organization. These aspects are important because they define a general framework that other chapters will complete with more concrete information.

Chapters 2 and 3 provide a broad outline of the case study. At this point, novice readers can take the time to read **appendix B**, where they will find a short remedial course explaining a number of basic computing notions, as well as concepts inherent to any Unix system.

To get on with our real subject matter, we will quite naturally start with the installation process (**chapter 4**); **chapters 5 and 6** will unveil basic tools that any Debian administrator will use, such as those of the **APT** family, which is largely responsible for the distribution’s excellent reputation. These chapters are in no way restricted to professionals, since everyone is their own administrator at home.

Chapter 7 will be an important parenthesis; it describes workflows to efficiently use documentation and to quickly gain an understanding of problems in order to solve them.

The next chapters will be a more detailed tour of the system, starting with basic infrastructure and services (**chapters 8 to 10**) and going progressively up the stack to reach the user applications in **chapter 13**. **Chapter 12** deals with more advanced subjects that will most directly concern administrators of large sets of computers (including servers), while **chapter 14** is a brief introduction to the wider subject of computer security and gives a few keys to avoid most problems.

Chapter 15 is for administrators who want to go further and create their own Debian packages.

VOCABULARY

Debian package

A Debian package is an archive containing all the files required to install a piece of software. It is generally a file with a `.deb` extension, and it can be handled with the `dpkg` command. Also called a *binary package*, it contains files that can be directly used (such as programs or documentation). On the other hand, a *source package* contains the source code for the software and the instructions required for building the binary package.

The present version is already the seventh edition of the book (we include the first four that were only available in French). This edition covers version 8 of Debian, code-named *Jessie*.

Among the changes, Debian now sports two new architectures — *arm64* for 64-bit ARM processors, and *ppc64el* for little-endian 64-bit PowerPC processors (designed by IBM and licensed to various manufacturers via the OpenPOWER foundation). On the opposite side, some architectures have been dropped (*sparc*, *ia64*) due to lack of volunteers to keep up with development (which itself can be explained by the fact that associated hardware is getting old and less interesting to work on). Some architectures are still available (in the *Unstable* distribution) but did not get their *ready for release* stamp: *hurd-i386*, *kfreebsd-i386*, *kfreebsd-amd64*. All included packages have obviously been updated, including the GNOME desktop, which is now in its version 3.14. More interestingly, there are two new alternative desktops that are available: [Cinnamon](http://cinnamon.linuxmint.com/)³ (fork of GNOME's Shell created by and for Linux Mint) and [MATE](http://mate-desktop.org/)⁴ (continuation of the GNOME 2.x desktop).

We have added some notes and remarks in sidebars. They have a variety of roles: they can draw attention to a difficult point, complete a notion of the case study, define some terms, or serve as reminders. Here is a list of the most common of these sidebars:

- **BACK TO BASICS:** a reminder of some information that is supposed to be known;
- **VOCABULARY:** defines a technical term, sometimes Debian specific;
- **COMMUNITY:** highlights important persons or roles within the project;
- **POLICY:** a rule or recommendation from the Debian Policy. This document is essential within the project, and describes how to package software. The parts of the policy highlighted in this book bring direct benefits to users (for example, knowing that the policy standardizes the location of documentation and examples makes it easy to find them even in a new package).
- **TOOL:** presents a relevant tool or service;
- **IN PRACTICE:** theory and practice do not always match; these sidebars contain advice resulting from our experience. They can also give detailed and concrete examples;
- other more or less frequent sidebars are rather explicit: **CULTURE**, **TIP**, **CAUTION**, **GOING FURTHER**, **SECURITY**, and so on.

Acknowledgments

A Bit of History

In 2003, Nat Makarévitch contacted Raphaël because he wanted to publish a book on Debian in the *Cahier de l'Admin* (Admin's Handbook) collection that he was managing for Eyrolles, a leading French editor of technical books. Raphaël immediately accepted to write it. The first edition came out on 14th October 2004 and was a huge success — it was sold out barely four months later.

³<http://cinnamon.linuxmint.com/>

⁴<http://mate-desktop.org/>

Since then, we have released 6 other editions of the French book, one for each subsequent Debian release. Roland, who started working on the book as a proofreader, gradually became its co-author.

While we were obviously satisfied with the book's success, we always hoped that Eyrolles would convince an international editor to translate it into English. We had received numerous comments explaining how the book helped people to get started with Debian, and we were keen to have the book benefit more people in the same way.

Alas, no English-speaking editor that we contacted was willing to take the risk of translating and publishing the book. Not put off by this small setback, we negotiated with our French editor Eyrolles and got back the necessary rights to translate the book into English and publish it ourselves. Thanks to a successful crowdfunding campaign, we worked on the translation between December 2011 and May 2012. The "Debian Administrator's Handbook" was born and it was published under a free-software license!

While this was an important milestone, we already knew that the story would be not be over for us until we could contribute the French book as an official translation of the English book. This was not possible at that time because the French book was still distributed commercially under a non-free license by Eyrolles.

In 2013, the release of Debian 7 gave us a good opportunity to discuss a new contract with Eyrolles. We convinced them that a license more in line with the Debian values would contribute to the book's success. That wasn't an easy deal to make, and we agreed to setup another crowdfunding campaign to cover some of the costs and reduce the risks involved. The operation was again a huge success and in July 2013, we added a French translation to the Debian Administrator's Handbook.

The Birth of the English Book

We are back in 2011 and we just got the required rights to make an English translation of our French book. We are looking into ways to make this happen.

Translating a book of 450 pages is a considerable effort that requires several months of work. Self-employed people like us had to ensure a minimum income to mobilize the time necessary to complete the project. So we set up a crowdfunding campaign on Ulule and asked people to pledge money towards the project.

➡ <http://www.ulule.com/debian-handbook/>

The campaign had two goals: raising €15,000 for the translation and completing a €25,000 liberation fund to get the resulting book published under a free license — that is, a license that fully follows the Debian Free Software Guidelines.

When the Ulule campaign ended, the first goal had been achieved with €24,345 raised. The liberation fund was not complete however, with only €14,935 raised. As initially announced, the liberation campaign continued independently from Ulule on the book's official website.

While we were busy translating the book, donations towards the liberation continued to flow in... And in April 2012, the liberation fund was completed. You can thus benefit from this book under the terms of a free license.

We would like to thank everybody who contributed to these fundraising campaigns, either by pledging some money or by passing the word around. We couldn't have done it without you.

Supportive Companies and Organizations

We had the pleasure of getting significant contributions from many free software-friendly companies and organizations. Thank you to [Code Lutin](http://www.codelutin.com)⁵, [École Ouverte Francophone](http://eof.eu.org)⁶, [Evolix](http://www.evolix.fr)⁷, [Fantini Bakery](http://www.fantinibakery.com)⁸, [FSF France](http://fsffrance.org)⁹, [Offensive Security](http://www.offensive-security.com)¹⁰ (the company behind [Kali Linux](http://www.kali.org)¹¹), [Opensides](http://www.opensides.be)¹², [Proxmox Server Solutions GmbH](http://www.proxmox.com)¹³, SSIELL (Société Solidaire d'Informatique En Logiciels Libres), and [Syminet](http://www.syminet.com)¹⁴.

We would also like to thank [OMG! Ubuntu](http://www.omgubuntu.co.uk)¹⁵ and [April](http://www.april.org)¹⁶ for their help in promoting the operation.

Individual Supporters

With over 650 supporters in the initial fundraising, and several hundred more in the continued liberation campaign, it is thanks to people like you that this project has been possible. Thank you!

We want to address our special thanks to those who contributed at least €35 (sometimes much more!) to the liberation fund. We are glad that there are so many people who share our values about freedom and yet recognize that we deserved a compensation for the work that we have put into this project.

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⁵<http://www.codelutin.com>

⁶<http://eof.eu.org>

⁷<http://www.evolix.fr>

⁸<http://www.fantinibakery.com>

⁹<http://fsffrance.org>

¹⁰<http://www.offensive-security.com>

¹¹<http://www.kali.org>

¹²<http://www.opensides.be>

¹³<http://www.proxmox.com>

¹⁴<http://www.syminet.com>

¹⁵<http://www.omgubuntu.co.uk>

¹⁶<http://www.april.org>

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The Liberation of the French Book

After the publication of the English book under a free software licence, we were in a weird sit-uation with a free book which is a translation of a non-free book (since it was still distributed commercially under a non-free license by Eyrolles).

We knew that fixing this would require us to convince Eyrolles that a free license would con-tribute to the book's success. The opportunity came to us in 2013 when we had to discuss a new contract to update the book for Debian 7. Since freeing a book often has a significant impact on its sales, as a compromise, we agreed to setup a crowdfunding campaign to offset some of the risks involved and to contribute to the publication costs of a new edition. The campaign was again hosted on Ulule:

➡ <http://www.ulule.com/liberation-cahier-admin-debian/>

The target was at €15,000 in 30 days. It took us less than a week to reach it, and at the end we got a whopping €25,518 from 721 supporters.

We had significant contributions from free software-friendly companies and organizations. Let us thank the [LinuxFr.org](http://linuxfr.org)¹⁷ website, [Korben](http://korben.info)¹⁸, [Addventure](http://www.addventure.fr)¹⁹, [Eco-Cystèmes](http://www.eco-csystemes.com/)²⁰, [ELOL SARI](http://elol.fr)²¹, and [Linuvers](http://www.linuvers.com)²². Many thanks to LinuxFr and Korben, they considerably helped to spread the news.

The operation has been a huge success because hundreds of people share our values of freedom and put their money to back it up! Thank you for this.

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¹⁷<http://linuxfr.org>

¹⁸<http://korben.info>

¹⁹<http://www.addventure.fr>

²⁰<http://www.eco-csystemes.com/>

²¹<http://elol.fr>

²²<http://www.linuvers.com>

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Thanks to Translators

Ever since the book has been freed, many volunteers have been busy translating it to numerous languages, such as Arabic, Brazilian Portuguese, German, Italian, Spanish, etc. Discover the full list of translations on the book's website: <http://debian-handbook.info/get/#other>

We would like to thank all the translators and translation reviewers. Your work is highly appreciated because it brings Debian into the hands of millions of persons who cannot read English.

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²³<http://dblatex.sourceforge.net>

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Keywords

- Objective**
- Means**
- Operation**
- Volunteer**

