

THE EXPERT'S VOICE® IN OPEN SOURCE

Pro Linux System Administration

*The complete guide to Linux administration—
everything from the basics to advanced concepts
explained by professional system administrators*

James Turnbull, Peter Lieverdink,
and Dennis Matotek

Apress®

Pro Linux System Administration



James Turnbull, Peter Lieverdink,
Dennis Matotek

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*To Ruth, who continues to make it all worthwhile,
and my family, who have always supported me
—James Turnbull*

*To Donna, Pixel, and Mustafa
—Peter Lieverdink*

*To Bianca and my children, Ziggy and Anika, plus the pets
—Dennis Matotek*

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He is a contributor to a number of open source projects and regularly speaks on topics related to writing, systems administration, and open source technologies.

He is the author of three books:

- *Pulling Strings with Puppet: Systems Administration Made Easy* (Apress, 2008), which explores the Ruby-based Puppet configuration management tool
- *Hardening Linux* (Apress, 2008), which focuses on hardening Linux bastion hosts including the base operating system, file systems, firewalls, connections, logging, testing your security, and securing a number of common applications including e-mail, FTP, and DNS
- *Pro Nagios 2.0* (Apress, 2006), which covers enterprise management using the Nagios open source tool

■ **PETER LIEVERDINK** was born in a small Dutch country town. He owns a pair of clogs, but has never eaten tulips or lived in a windmill.

On his 22nd birthday, Peter moved to Australia and briefly worked in an office cubicle. He now runs his own business, Creative Contingencies Pty, Ltd. The business depends on open source software for infrastructure and development as well as daily office tasks.

Peter specializes in web application development and helping other businesses implement open source solutions using Linux on both desktops and servers.

■ **DENNIS MATOTEK** was born in a small town in Victoria, Australia, called Mildura. As with all small towns, the chronic lack of good, strong coffee in Mildura drives the young to search further afield. Dennis moved to Melbourne where good, strong coffee flows through the city in a river called the Yarra. However, it was in Scotland during a two-year hunt for one of them fierce, blue-faced, part-smurf Scotsmen that Dennis was introduced to systems administration.

Scotland, on the technological edge, had 486DX PCs and a VAX. On arriving back in Melbourne, after staying awake for 24 hours at an airport minding his bags, Dennis was given a job interview—jobs in those days fell down like snow from the sky.

Since that time, Dennis has stayed predominately in Melbourne working with IBM AS400s (iSeries) for six years and mainly Linux for nine years. Dennis also wrote and directed some short films and plays. He has a lovely LP (life partner) and a little boy called Zigfryd and a new little girl called Anika, whom he misses terribly when at work, which is most of the time.

Oh, and he never did find one of those Scotsmen.

About the Technical Reviewer

■ **JAIME SICAM** occasionally works as an IT instructor and consultant. Prior to his hiatus from working full time, he indulged himself as one of the system administrators in the engineering team of Defender Technologies Group.

Jaime takes pride in being part of DOST-ASTI (Advanced Science and Technology Institute) on Bayanihan Linux. His team advocated the use of open source software for the computing needs of government agencies, schools, and small and medium-size enterprises in the Philippines. He enjoys technology, road trips, and keeping up to date on news of the Utah Jazz.

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The team at Apress

Introduction

Information technology plays a critical role in business success. Investment in technology can increase productivity. It can provide access to new markets—for example, via the Internet. So understanding information technology and how it can serve your business is important.

You also need to understand the cost of the technology that your business relies on and how to make the best use of it. Today, one of your potential technology choices is free and open source software, or FOSS, which does not require license fees or maintenance charges and represents a serious and cost-effective alternative to commercial software.

This book is designed to guide the small business entrepreneur into the world of free and open source software. We will show you how to use open source software and how it brings low-cost and first-class information technology within reach of all businesses, even the smallest startups. The book explains how to install and configure open source software and how to tap into the global community that creates and supports FOSS.

From providing a basic file server for the office to setting up a web server, building your own IT systems puts you in control of your business. Whether you want to manage your own systems or just understand them better so you know what your support professionals are doing, this book is for you.

Linux and Free and Open Source Software

Linux is one of the most famous pieces of FOSS software. Linux, also sometimes called GNU/Linux, is a computer operating system, like Microsoft Windows or Apple Mac OS X. Unlike these other operating systems, Linux is free. Linux users also have the freedom to contribute to its development because the software source code is open and accessible to study and modification. In addition to this, Linux users are also free to share this software with others.

Linux was originally developed by Finnish programmer Linus Torvalds. First released in 1991, it has since grown to encompass an army of developers, tens of thousands of applications and tools, and millions of users.

Linux, however, is no longer just in the realm of the hobbyist enthusiast. Linux servers now run mission-critical applications in establishments like banks, manufacturing companies, and government organizations, and form the backbone of many media and Internet-based concerns.

What makes Linux different? Well, Linux is built with a collaborative development model. Linux, and the software that runs on it, is created by volunteers and by the employees of companies, governments, and organizations from all over the world. Some of the biggest companies in the world develop and use open source software including IBM, HP, Oracle, and Sun. Whole organizations have also built and developed products and support infrastructure around Linux and open source software.

Many of the principles behind FOSS are derived from the scientific principles of transparency. The openness and transparency of the code and development process means that open source software is not only contributed to by a variety of people but also audited at all levels. The free and open source community treats software just like any other information and believes people have the right to have full control over that information. You should be free to share it with anyone you wish in much the same way you are free to share recipes with your neighbors.

None of this impacts the day-to-day reality of running your business, but it is the philosophy that means FOSS exists. The practical reality of open source software is the freedom to run a huge variety of software in your business and modify or customize it for your own needs. Your information technology needs will grow as your business grows, and the real strength of FOSS lies in its scalability. You don't need to buy new licenses for every new machine you buy for a new staff member or for every additional CPU core in a server.

Note Some people get confused between software and operating systems. An *operating system* is a collection of programs that controls how the computer operates. It knows how to talk to a printer or to another computer and to write information to your hard drive. Red Hat Enterprise Linux or Microsoft Windows Server 2007 are examples of operating systems. In comparison, software or application software can be something like a word processor or web browser. It requires the underlying operating system to function but performs some separate function. You can run a computer operating system without any software, but you cannot run a computer without any operating system.

WHAT DO YOU MEAN BY FREE?

FOSS software is free software for which the source code is available and is subject to one of a series of licenses. These licenses mandate that the software be freely available and not sold as a commercial product. The most commonly used license is the GNU General Public License (GPL). The GPL gives people who receive a copy of GPL-licensed software permission to reproduce, change, or distribute the work as long as any resulting copies or changes are also bound by the same GPL licensing scheme or with terms no more restrictive than those of the original license. An example of GPL-licensed software is the Firefox web browser.

Other open source licenses include LGPL, or GNU Lesser General Public License, Apache License, MIT license, and Artistic License. Most of the time though, you won't need to care about licenses and, more important, you won't need to *pay* for licenses!

There are some excellent references on FOSS licensing, but one of the best is an article by Mark Webbink, Senior Vice President and General Counsel of Red Hat, Inc., that is available at <http://www.groklaw.net/article.php?story=20031231092027900>. You can also find a mostly complete list of licenses and an explanation of their terms and conditions at the Free Software Foundation (FSF) website—<http://www.fsf.org/licensing/licenses/>.

Why Do You Need a Linux Server?

There are lots of good reasons to install a Linux server. Linux has all the features of similar commercial operating systems like the Microsoft Windows Server platform. For example:

- *Customer care*

Free and open source software can help you communicate more effectively with your customers and be more responsive to their needs. After all, it is the quality of the relationships with your customers that really drives your business forward. E-mail has become the lifeblood of small business communication. FOSS lets you access features usually reserved for companies running mainframe mail servers and integrated communication suites. Productivity and database tools will help you professionally interact with colleagues, suppliers, and customers, and build and maintain those critical contacts more effectively.

- *Business efficiency*

Having your own Linux server will help you to secure your computer network, keep it up and running, and protect your critical business information, like accounts and intellectual property. Spending less time and money on technology issues frees you to spend more time focusing on your business and your employee's productivity.

- *Secure and stable*

Choosing Linux guarantees you have access to the most up-to-date software to keep your desktops and servers current with the latest versions and security patches, enhancing the safety and reliability of your network. There is no need to pay extra or upgrade to get full functionality software or access new features.

- *Nimble and responsive*

From a development point of view, you can be at the edge of technological innovation. You are able to participate in leading development projects and help design systems that are right for your organization. From embedded devices to mainframes, Linux has the software you can use. You are not tied to the release cycle of some other organization, which means you are in control of your business and its future direction.

- *Freedom to grow*

Access premium business software without paying for premium software licenses. This gives you the freedom to redirect licensing fees for software into customized services to meet the needs of your business or new hardware that delivers functionality you may not have otherwise been able to afford. Free and open source software will save you money and offer you unlimited flexibility and scalability for future growth.

What Does This Book Expect You to Know?

Well, most importantly, you don't need to know anything about Linux! We'll teach you everything you need to know about installing and configuring Linux servers and the applications that run on them.

In writing this book, we've assumed you know a little about computing. We've assumed you have

- Some familiarity with Microsoft Windows and its concepts
- Some exposure to networking including concepts like IP addresses

Note Where possible, we've tried to direct you to links and resources that will help you extend your knowledge or provide more information on a particular topic.

What You Will Learn in This Book

This book is not about running your business; it is about running the computer systems that will support your business by helping you manage the information flow that is unique to your enterprise.

E-mail, web, and file servers as well as desktop computers and printers are essential tools for business. Open source software gives small businesses the opportunity to turn these tools into an efficient business system, not just a jumble of techno-tools.

Each chapter in this book looks at a different component or tool that will allow you to manage and support the technology in your business.

Part 1: The Beginning

In this part, we will teach you the Linux basics: how to install, how to configure, and how to manage Linux systems.

Chapter 1

We'll introduce you to some Linux distributions and how to choose an appropriate one for your needs.

Chapter 2

We take you through installing Linux, using two commonly used distributions, Red Hat Enterprise Linux and Ubuntu Server.

Chapter 3

This is a general guide to interacting with a Linux server and the basics of how to use Linux.

Chapter 4

You'll learn about users and groups and how to create, delete, and manage them.

Chapter 5

You'll learn about starting and stopping your server and managing the services and applications you're going to run on it.

Chapter 6

We'll explain networking with Linux including IP addressing and using a firewall to secure your Linux servers.

Chapter 7

You'll gain an understanding of packages, packaging, and package management. You'll understand how to install, manage, and remove software on your Linux server.

Chapter 8

You'll learn about disks, storage, and how to use and manage a variety of storage configurations including RAID on your Linux server.

Part 2: Making It Work for You

In this part, we'll show you how to put your newly gained knowledge to use by installing and configuring the services needed to run your business. We'll also show you how to keep them in optimum condition and how to automate system management and deployment.

Chapter 9

This chapter introduces many of the “plumbing” concepts like DHCP, DNS, and NTP that will tie together your Linux-based environment.

Chapter 10

We'll show you how to run your own mail server, manage mail boxes for your organization, allow remote access to e-mail, and protect your organization from spam and viruses.

Chapter 11

In this chapter, we demonstrate how to run your own web server, configure the useful MySQL database engine, and install and manage your own web applications.

Chapter 12

We'll teach you how to do file sharing and print serving with Linux—services that are compatible and can be used with Microsoft Windows servers and desktops! Included is an introduction to a free document management system that rivals Microsoft's SharePoint application.

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