Roderick W. Smith

LPIC-1

Linux Professional Institute Certification

STUDY GUIDE

Third Edition

EXAMS 101 AND 102

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Linux Professional Institute Certification

Study Guide

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Copyright © 2013 by John Wiley & Sons, Inc., Indianapolis, Indiana
Published simultaneously in Canada
ISBN: 978-1-118-49563-6
ISBN: 978-1-118-52648-4 (ebk.)
ISBN: 978-1-118-57047-0 (ebk.)

ISBN: 978-1-118-57055-5 (ebk.)

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Library of Congress Control Number: 2012951869

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Acknowledgments

Although this book bears my name as author, many other people contributed to its creation. Without their help, this book wouldn't exist, or at best would exist in a lesser form. Jeff Kellum was the acquisitions editor and so helped get the book started. Alexa Murphy, the developmental editor, and Eric Charbonneau, the production editor, oversaw the book as it progressed through all its stages. Ross Brunson and Kevin Glendenning were the technical editors who checked the text for technical errors and omissions — but any mistakes that remain are my own. Kim Wimpsett, the copy editor, helped keep the text grammatical and understandable. The proofreader, Candace Cunningham, checked the text for typos. I'd also like to thank Neil Salkind and others at Studio B, who helped connect me with Wiley to write this book.

About the Author

Roderick W. Smith is a Linux consultant and author. He has written more than 20 books on Linux, FreeBSD, and computer networking, including *Linux Essentials*, the *LPIC-2 Study Guide*, and *Linux Administrator Street Smarts* (all from Sybex). He can be reached at rodsmith@rodsbooks.com.

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Introduction

Why should you learn about Linux? It's a fast-growing operating system, and it is inexpensive and flexible. Linux is also a major player in the small and mid-sized server field, and it's an increasingly viable platform for workstation and desktop use as well. By understanding Linux, you'll increase your standing in the job market. Even if you already know Windows or Mac OS and your employer uses these systems exclusively, understanding Linux will give you an edge when you're looking for a new job or you're looking for a promotion. For instance, this knowledge will help you make an informed decision about if and when you should deploy Linux.

The Linux Professional Institute (LPI) has developed its LPI-1 certification as an introductory certification for people who want to enter careers involving Linux. The exam is meant to certify that an individual has the skills necessary to install, operate, and troubleshoot a Linux system and is familiar with Linux-specific concepts and basic hardware.

The purpose of this book is to help you pass the LPIC-1 exams (101 and 102) updated in 2012. Because these exams cover basic Linux installation, configuration, maintenance, applications, networking, and security, those are the topics that are emphasized in this book. You'll learn enough to get a Linux system up and running and to configure it for many common tasks. Even after you've taken and passed the LPIC-1 exams, this book should remain a useful reference.

What Is Linux?

Linux is a clone of the Unix operating system (OS) that has been popular in academia and many business environments for years. Formerly used exclusively on large mainframes, Unix and Linux can now run on small computers—which are actually far more powerful than the mainframes of just a few years ago. Because of its mainframe heritage, Unix (and hence also Linux) scales well to perform today's demanding scientific, engineering, and network server tasks.

Linux consists of a kernel, which is the core control software, and many libraries and utilities that rely on the kernel to provide features with which users interact. The OS is available in many different distributions, which are collections of a specific kernel with specific support programs.

Why Become Linux Certified?

Several good reasons to get your Linux certification exist. There are four major benefits:

Relevance The exams were designed with the needs of Linux professionals in mind. This was done by performing surveys of Linux administrators to learn what they actually need to know to do their jobs.

Quality The exams have been extensively tested and validated using psychometric standards. The result is an ability to discriminate between competent administrators and those who must still learn more material.

Neutrality LPI is an organization that doesn't itself market any Linux distribution. This fact removes the motivation to create an exam that's designed as a way to market a particular distribution.

Support The exams are supported by major players in the Linux world.

How to Become Certified

The certification is available to anyone who passes the two required exams: 101 and 102. You don't have to work for a particular company. It's not a secret society.

The exam is administered by Pearson VUE. The exam can be taken at any Pearson VUE testing center. If you pass, you will get a certificate in the mail saying that you have passed. Contact (877) 619-2096 for Pearson VUE contact information.

To register for the exam with Pearson VUE, call (877) 619-2096, or register online at `http://www.vue.com`. However you do it, you'll be asked for your name, mailing address, phone number, employer, when and where you want to take the test (i.e., which testing center), and your credit card number (arrangement for payment must be made at the time of registration).

Who Should Buy This Book

Anybody who wants to pass the certification exams may benefit from this book. This book covers the material that someone new to Linux will need to learn the OS from the beginning, and it continues to provide the knowledge you need up to a proficiency level sufficient to pass the two exams. You can pick up this book and learn from it even if you've never used Linux before, although you'll find it an easier read if you've at least casually used Linux for a few days. If you're already familiar with Linux, this book can serve as a review and as a refresher course for information with which you might not be completely familiar. In either case, reading this book will help you pass the exams.

This book is written with the assumption that you know at least a little bit about Linux (what it is and possibly a few Linux commands). I also assume you know some basics about

computers in general, such as how to use a keyboard, how to insert a disc into an optical drive, and so on. Chances are, you have used computers in a substantial way in the past—perhaps even Linux, as an ordinary user, or maybe you have used Windows or Mac OS. I do not assume that you have extensive knowledge of Linux system administration, but if you've done some system administration, you can still use this book to fill in gaps in your knowledge.

As a practical matter, you'll need a Linux system with which to practice and learn in a hands-on way. Neither the exams nor this book covers actually installing Linux on a computer from scratch, although some of the prerequisites (such as disk partitioning) are covered. You may need to refer to your distribution's documentation to learn how to accomplish this task. Alternatively, several vendors sell computers with Linux pre-installed.

How This Book Is Organized

This book consists of 10 chapters plus supplementary information: an online glossary, this introduction, and the assessment test after the introduction. The chapters are organized as follows:

- Chapter 1, "Exploring Linux Command-Line Tools," covers the basic tools you need to interact with Linux. These include shells, redirection, pipes, text filters, and regular expressions.
- Chapter 2, "Managing Software," describes the programs you'll use to manage software. Much of this task is centered around the RPM and Debian package management systems. The chapter also covers handling shared libraries and managing processes (that is, running programs).
- Chapter 3, "Configuring Hardware," focuses on Linux's interactions with the hardware on which it runs. Specific hardware and procedures for using it include the BIOS, expansion cards, USB devices, hard disks, and the partitions and filesystems used on hard disks.
- Chapter 4, "Managing Files," covers the tools used to manage files. This includes commands to manage files, ownership, and permissions, as well as Linux's standard directory tree and tools for archiving files.
- Chapter 5, "Booting Linux and Editing Files," explains how Linux boots up and how you can edit files in Linux. Specific topics include the GRUB Legacy and GRUB 2 boot loaders, boot diagnostics, runlevels, and the Vi editor.
- Chapter 6, "Configuring the X Window System, Localization, and Printing," describes the Linux GUI and printing subsystems. Topics include X configuration, managing GUI logins, configuring location-specific features, enabling accessibility features, and setting up Linux to use a printer.

- Chapter 7, "Administering the System," describes miscellaneous administrative tasks. These include user and group management, tuning user environments, managing log files, setting the clock, and running jobs in the future.
- Chapter 8, "Configuring Basic Networking," focuses on basic network configuration. Topics include TCP/IP basics, setting up Linux on a TCP/IP network, and network diagnostics.
- Chapter 9, "Writing Scripts, Configuring Email, and Using Databases," covers these miscellaneous topics. Scripts are small programs that administrators often use to help automate common tasks. Email, of course, is an important topic for any computer user, particularly on Linux, which often runs an email server for local or remote use. Linux can run databases that help you store and retrieve information, and these tools can be very important ones on many Linux systems.
- Chapter 10, "Securing Your System," covers security. Specific subjects include network security, local security, and the use of encryption to improve security.

Chapters 1 through 5 cover the 101 exam, while Chapters 6 through 10 cover the 102 exam. These make up Part I and Part II of the book, respectively.

Each chapter begins with a list of the exam objectives that are covered in that chapter. The book doesn't cover the objectives in order. Thus, you shouldn't be alarmed at some of the odd ordering of the objectives within the book. At the end of each chapter, you'll find a couple of elements you can use to prepare for the exam:

Exam Essentials This section summarizes important information that was covered in the chapter. You should be able to perform each of the tasks or convey the information requested.

Review Questions Each chapter concludes with 20 review questions. You should answer these questions and check your answers against the ones provided after the questions. If you can't answer at least 80 percent of these questions correctly, go back and review the chapter, or at least those sections that seem to be giving you difficulty.

The review questions, assessment test, and other testing elements included in this book are *not* derived from the actual exam questions, so don't memorize the answers to these questions and assume that doing so will enable you to pass the exam. You should learn the underlying topic, as described in the text of the book. This will let you answer the questions provided with this book *and* pass the exam. Learning the underlying topic is also the approach that will serve you best in the workplace—the ultimate goal of a certification.

To get the most out of this book, you should read each chapter from start to finish and then check your memory and understanding with the chapter-end elements. Even if you're already familiar with a topic, you should skim the chapter; Linux is complex enough that there are often multiple ways to accomplish a task, so you may learn something even if you're already competent in an area.

Additional Study Tools

Readers of this book can access a Web site that contains several additional study tools, including the following:

Readers can access these tools by visiting `http://www.sybex.com/go/lpic3e`.

Sample Tests All of the questions in this book will be included, including the assessment test at the end of this introduction and the 200 questions from the review sections at the end of each chapter. In addition, there are two 50-question bonus exams. The test engine runs on Windows, Linux, and Mac OS.

Electronic Flashcards The additional study tools includes 150 questions in flashcard format (a question followed by a single correct answer). You can use these to review your knowledge of the exam objectives. The flashcards run on both Windows and Linux.

Glossary of Terms as a PDF File In addition, there is a searchable glossary in PDF format, which can be read on all platforms that support PDF.

Conventions Used in This Book

This book uses certain typographic styles in order to help you quickly identify important information and to avoid confusion over the meaning of words such as on-screen prompts. In particular, look for the following styles:

- *Italicized text* indicates key terms that are described at length for the first time in a chapter. (Italics are also used for emphasis.)
- `A monospaced font` indicates the contents of configuration files, messages displayed at a text-mode Linux shell prompt, filenames, text-mode command names, and Internet URLs.
- *`Italicized monospaced text`* indicates a variable—information that differs from one system or command run to another, such as the name of a client computer or a process ID number.
- **`Bold monospaced text`** is information that you're to type into the computer, usually at a Linux shell prompt. This text can also be italicized to indicate that you should substitute an appropriate value for your system. (When isolated on their own lines, commands are preceded by non-bold monospaced `$` or `#` command prompts, denoting regular user or system administrator use, respectively.)

In addition to these text conventions, which can apply to individual words or entire paragraphs, a few conventions highlight segments of text:

A note indicates information that's useful or interesting but that's somewhat peripheral to the main text. A note might be relevant to a small number of networks, for instance, or it may refer to an outdated feature.

A tip provides information that can save you time or frustration and that may not be entirely obvious. A tip might describe how to get around a limitation or how to use a feature to perform an unusual task.

Warnings describe potential pitfalls or dangers. If you fail to heed a warning, you may end up spending a lot of time recovering from a bug, or you may even end up restoring your entire system from scratch.

Sidebar

A sidebar is like a note but longer. The information in a sidebar is useful, but it doesn't fit into the main flow of the text.

Real World Scenario

Real World Scenario

A real world scenario is a type of sidebar that describes a task or example that's particularly grounded in the real world. This may be a situation I or somebody I know has encountered, or it may be advice on how to work around problems that are common in real, working Linux environments.

EXERCISE: EXERCISE

An exercise is a procedure you should try on your own computer to help you learn about the material in the chapter. Don't limit yourself to the procedures described in the exercises, though! Try other commands and procedures to really learn about Linux.