LPI™ Linux® Essentials

STUDY GUIDE

EXAM 010 v1.6

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90 electronic flashcards

Searchable key term glossary

CHRISTINE BRESNAHAN
RICHARD BLUM

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Linux Essentials
Study Guide
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Christine Bresnahan

Richard Blum

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"As iron sharpens iron, so one man sharpens another." Proverbs 27:17 (NIV)

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About the Authors

Christine Bresnahan started working with computers more than 30 years ago in the IT industry as a systems administrator. Christine is an adjunct professor at Ivy Tech Community College, where she teaches Linux certification and Python programming classes. She also writes books and produces instructional resources for the classroom.

Richard Blum has also worked in the IT industry for more than 30 years as both a system and network administrator, and he has published numerous Linux and open source books. Rich is an online instructor for Linux and web programming courses that are used by colleges and universities across the United States. When he is not being a computer nerd, Rich enjoys spending time with his wife, Barbara, and his two daughters, Katie and Jessica.

Contents at a Glance

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Introduction

This book you hold in your hands provides a solid introduction to the Linux operating system. As its title suggests, it will give you the essential knowledge to begin using and managing this powerful operating system (OS), which is an important one in today's computing world.

The Linux Professional Institute, or LPI (`lpi.org`), offers a series of Linux certifications. These certifications aim to provide proof of skill levels for employers; if you've passed a particular certification, you should be competent to perform certain tasks on Linux computers. The LPI exams include Linux Essentials, LPIC-1, LPIC-2, and the LPIC-3 series. As the name implies, the Linux Essentials exam is the lowest level of the four exams, covering the most basic tasks of using and administering a Linux computer.

The purpose of this book is to help you pass the Linux Essentials exam, updated in 2019 to version 1.6. The Linux Essentials exam is meant to certify that you:

- Understand the open source industry
- Have knowledge of the most popular open source applications
- Understand the major components of Linux
- Can work at the Linux command line
- Have basic knowledge of security and administration-related concepts
- Know where to go for help

Why Become Linux Certified?

With the growing popularity of Linux (and the increase in Linux-related jobs) comes hype. With all the hype that surrounds Linux it's become hard for employers to distinguish between employees who are competent Linux users and those who just know the buzzwords. This is where the Linux Essentials certification comes in.

With a Linux Essentials certification, you will establish yourself as a Linux user who is familiar with the Linux platform and its applications and who can use any type of Linux system. LPI has created the Linux Essentials exams as a way for employers to have confidence in knowing their employees who pass the exam will have the skills necessary to get the job done.

How to Become Certified

The certification is available to anyone who passes the LPI Linux Essentials required exam. The current version of the exam is version 1.6 and is denoted as 010-160.

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.

To register for the exam with Pearson VUE register online at `home.pearsonvue.com`. You'll have to provide your name, mailing address, phone number, employer, when and where you want to take the test (which testing center), and your credit card number (arrangement for payment must be made at the time of registration).

Who Should Buy This Book

You may have been assigned this book for a class that you're taking, but if not, it can still have value for self-study or as a supplement to other resources. If you're new to Linux, this book covers the material that you will need to learn the OS from the beginning. You can pick up this book and learn from it even if you've never used Linux before. If you're already familiar with Linux, you'll have a leg up on many of the topics described in these pages.

This book is written with the assumption that you know at least a little about computers generally, such as how to use a keyboard, how to insert a disc into an optical drive, and so on. Chances are that 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 macOS. We do *not* assume that you have knowledge of how to use a Linux system.

It will also help to have a Linux system available to follow along with. Each chapter contains a simple exercise that will walk you through the basic concepts presented in the chapter. This provides the crucial hands-on experience that you'll need, both to pass the exam and to do well in the Linux world.

Although the LPI Linux Essentials exam is Linux distribution neutral, it's impossible to write exercises that work in all Linux distributions. That said, the exercises in this book assume you have a learning environment similar to the one described in Appendix B "Setting up a Linux Environment."

How This Book Is Organized

This book consists of 15 chapters, two appendixes, plus this introduction and the assessment test after the introduction. The chapters are organized as follows:

- Chapter 1, "Selecting an Operating System," provides a birds-eye view of the world of operating systems. The chapter will help you understand exactly what Linux is and the situations in which you might want to use it.

- Chapter 2, "Understanding Software Licensing," describes copyright law and the licenses that both Linux and non-Linux OSs use to expand or restrict users' rights to use and copy software.
- Chapter 3, "Investigating Linux's Principles and Philosophy," covers Linux's history and the ways in which Linux, and other OSs, are commonly used.
- Chapter 4, "Using Common Linux Programs," looks at the major categories of Linux software, and it provides pointers to some of the most popular Linux programs.
- Chapter 5, "Getting to Know the Command Line," tackles using typed commands to control Linux. Although many new users find this topic intimidating, command-line control of Linux is important.
- Chapter 6, "Managing Hardware," provides advice on how to select and use hardware in Linux. Specific topics range from the central processing unit (CPU) to device drivers.
- Chapter 7, "Managing Files," describes how to move, rename, delete, and edit files. Directories are just a special type of file, so they are covered here as well.
- Chapter 8, "Searching, Extracting, and Archiving Data," summarizes the tools that you can use to find data on your computer, as well as how you can manipulate data archive files for data transport and backup purposes.
- Chapter 9, "Exploring Processes and Process Data," describes how to install programs in Linux and how to adjust the priority of running programs or terminate selected programs.
- Chapter 10, "Editing Files," introduces the topic of editing text files. This includes the basic features of the `nano` and `vi` text-mode text editors, as well as some common configuration file and formatted text file conventions.
- Chapter 11, "Creating Scripts," describes how to create simple scripts, which are programs that can run other programs. You can use scripts to help automate otherwise tedious manual tasks, thus improving your productivity.
- Chapter 12, "Understanding Basic Security," introduces the concepts that are critical to understanding Linux's multiuser nature. It also covers super user privileges, which Linux uses for most administrative tasks.
- Chapter 13, "Creating Users and Groups," covers the software and procedures you use to create, modify, and delete accounts and groups, which define who may use the computer.
- Chapter 14, "Setting Ownership and Permissions," describes how to control which users may access files and in what ways they may do so. In conjunction with users and groups, ownership and permissions control your computer's security.
- Chapter 15, "Managing Network Connections," covers the critical topic of telling Linux how to use a network, including testing the connection and some basic network security measures.

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 10 review questions. You should answer these questions and check your answers against the ones provided in Appendix A. 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 website that contains several additional study tools, including the following:

Readers can access these tools by visiting `wiley.com/go/sybextestprep`.

Sample Tests All the questions in this book are there, including the assessment test at the end of this introduction and the questions from the review sections at the end of each chapter. In addition, there are two bonus exams.

Electronic Flashcards The additional study tools include questions in flashcard format (a question followed by a single correct answer). You can use these flashcards to review your knowledge of the exam objectives.

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 onscreen 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.

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.

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.

The Exam Objectives

Behind every computer industry exam you can be sure to find exam objectives—the broad topics in which exam developers want to ensure your competency. The official exam objectives are listed here. (They're also printed at the start of the chapters in which they're covered.)

Exam objectives are subject to change at any time without prior notice and at LPI's sole discretion. Please visit LPI's website (`lpi.org`) for the most current listing of exam objectives.

Exam 010-160 Objectives

The following are the areas in which you must be proficient in order to pass the Linux Essentials 010-160 exam. This exam is broken into five main topics, each of which has three to eight objectives. Each objective has an associated weight, which reflects its importance to the exam as a whole. Refer to the LPI website to view the weights associated with each objective. The five main topics are as follows:

Subject Area
1 The Linux Community and a Career in Open Source
2 Finding Your Way on a Linux System
3 The Power of the Command Line
4 The Linux Operating System
5 Security and File Permissions

Topic 1: The Linux Community and a Career in Open Source

1.1 Linux Evolution and Popular Operating Systems (Chapters 1 and 3)

- Knowledge of Linux development and major distributions
- Key knowledge areas:
  - Distributions:
    - Embedded Systems
    - Linux in the Cloud

1.2 Major Open Source Applications (Chapter 4)

- Awareness of major applications as well as their uses and development
- Key knowledge areas:
  - Desktop applications
  - Server applications
  - Development languages
  - Package management tools and repositories

1.3 Open Source Software and Licensing (Chapter 2)

- Open communities and licensing Open Source Software for business
- Key knowledge areas:
  - Open source philosophy
  - Open source licensing
  - Free Software Foundation (FSF), Open Source Initiative (OSI)

1.4 ICT Skills and Working in Linux (Chapters 4 and 5)

- Basic Information and Communication Technology (ICT) skills and working in Linux
- Key knowledge areas:
  - Desktop skills
  - Getting to the command line
  - Industry uses of Linux, cloud computing and virtualization

Topic 2: Finding Your Way on a Linux System

2.1 Command Line Basics (Chapters 5, 7 and 11)

- Basics of using the Linux command line
- Key knowledge areas:
  - Basic shell
  - Command line syntax
  - Variables
  - Quoting

2.2 Using the Command Line to Get Help (Chapter 5)

- Running help commands and navigation of the various help systems
- Key knowledge areas:
  - Man pages
  - Info pages

2.3 Using Directories and Listing Files (Chapter 7)

- Navigation of home and system directories and listing files in various locations
- Key knowledge areas:
  - Files, directories
  - Hidden files and directories
  - Home directories
  - Absolute and relative paths

2.4 Creating, Moving, and Deleting Files (Chapter 7)

- Create, move, and delete files and directories under the home directory.
- Key knowledge areas:
  - Files and directories
  - Case sensitivity
  - Simple globbing

Topic 3: The Power of the Command Line

3.1 Archiving Files on the Command Line (Chapter 8)

- Archiving files in the user home directory
- Key knowledge areas:
  - Files, directories
  - Archives, compression

3.2 Searching and Extracting Data from Files (Chapters 5 and 8)

- Search and extract data from files in the home directory.
- Key knowledge areas:
  - Command line pipes
  - I/O redirection
  - Basic Regular Expressions using `.`, `[ ]`, `*`, and `?`

3.3 Turning Commands into a Script (Chapters 10 and 11)

- Turning repetitive commands into simple scripts
- Key knowledge areas:
  - Basic shell scripting
  - Awareness of common text editors (`vi` and `nano`)

Topic 4: The Linux Operating System

4.1 Choosing an Operating System (Chapter 1)

- Knowledge of major operating systems and Linux distributions
- Key knowledge areas:
  - Differences between Windows, OS X, and Linux
  - Distribution life cycle management

4.2 Understanding Computer Hardware (Chapter 6)

- Familiarity with the components that go into building desktop and server computers
- Key knowledge areas:
  - Motherboards, processors, power supplies, optical drives, peripherals
  - Hard drives, solid state disks and partitions, `/dev/sd*`
  - Drivers

4.3 Where Data Is Stored (Chapters 7 and 9)

- Where various types of information are stored on a Linux system
- Key knowledge areas:
  - Programs and configuration
  - Processes
  - Memory addresses
  - System messaging
  - Logging

4.4 Your Computer on the Network (Chapter 15)

- Querying vital networking configuration and determining the basic requirements for a computer on a Local Area Network (LAN)
- Key knowledge areas:
  - Internet, network, routers
  - Querying DNS client configuration
  - Querying network configuration

Topic 5: Security and File Permissions

5.1 Basic Security and Identifying User Types (Chapter 12)

- Various types of users on a Linux system
- Key knowledge areas:
  - Root and standard users
  - System users

5.2 Creating Users and Groups (Chapter 13)

- Creating users and groups on a Linux system
- Key knowledge areas:
  - User and group commands
  - User IDs

5.3 Managing File Permissions and Ownership (Chapter 14)

- Understanding and manipulating file permissions and ownership settings
- Key knowledge areas:
  - File permissions and ownership
  - Directory permissions and ownership

5.4 Special Directories and Files (Chapter 7)

- Special directories and files on a Linux system including special permissions
- Key knowledge areas:
  - Using temporary files and directories
  - Symbolic links