国外计算机科学教材系列

UNIX初级教程

（第四版）

UNIX Unbounded: A Beginning Approach

Fourth Edition

英文版

[美] Amir Afzal 著

Prentice Hall

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内容简介

UNIX是一类功能强大的主流操作系统。本书从初学者的角度介绍了UNIX的系统概念和命令的使用，所选内容都是针对初学者完成日常工作所必需的各方面。具体涉及UNIX系统的常用命令、vi编辑器、文件操作、Shell命令解释器、UNIX通信工具、程序开发工具和一些更深入的UNIX命令。书中还包括Linux操作系统以及Bourne Again Shell命令等内容。本书帮助读者由浅入深、循序渐进地学习UNIX，形成清晰的概念，避免了直接罗列复杂的命令格式。

本书可作为UNIX双语教学和软件学院初级课程的教学用书，也可供使用UNIX的科技工作者阅读和参考。

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出 版 说 明

21世纪初的5至10年是我国国民经济和社会发展的重要时期，也是信息产业快速发展的关键时期。在我国加入WTO后的今天，培养一支适应国际化竞争的一流IT人才队伍是我国高等教育的重要任务之一。信息科学和技术方面人才的优劣与多寡，是我国面对国际竞争时成败的关键因素。

当前，正值我国高等教育特别是信息科学领域的教育调整、变革的重大时期，为使我国教育体制与国际化接轨，有条件的高等院校正在为某些信息学科和技术课程使用国外优秀教材和优秀原版教材，以使我国在计算机教学上尽快赶上国际先进水平。

电子工业出版社秉承多年来引进国外优秀图书的经验，翻译出版了“国外计算机科学教材系列”丛书，这套教材覆盖学科范围广、领域宽、层次多，既有本科专业课程教材，也有研究生课程教材，以适应不同院系、不同专业、不同层次的师生对教材的需求，广大师生可自由选择和自由组合使用。这些教材涉及的学科方向包括网络与通信、操作系统、计算机组织与结构、算法与数据结构、数据库与信息处理、编程语言、图形图像与多媒体、软件工程等。同时，我们也适当引进了一些优秀英文原版教材，本着翻译版本和英文原版并重的原则，对重点图书既提供英文原版又提供相应的翻译版本。

在图书选题上，我们大都选择国外著名出版公司出版的高校教材，如Pearson Education培生教育出版集团、麦格劳－希尔教育出版集团、麻省理工学院出版社、剑桥大学出版社等。撰写教材的许多作者都是蜚声世界的教授、学者，如道格拉斯·科默（Douglas E. Comer）、威廉·斯托林斯（William Stallings）、哈维·戴特尔（Harvey M. Deitel）、尤利斯·布莱克（Uyless Black）等。

为确保教材的选题质量和翻译质量，我们约请了清华大学、北京大学、北京航空航天大学、复旦大学、上海交通大学、南京大学、浙江大学、哈尔滨工业大学、华中科技大学、西安交通大学、国防科学技术大学、解放军理工大学等著名高校的教授和骨干教师参与了本系列教材的选题、翻译和审校工作。他们中既有讲授同类教材的骨干教师、博士，也有积累了几十年教学经验的老教授和博士生导师。

在该系列教材的选题、翻译和编辑加工过程中，为提高教材质量，我们做了大量细致的工作，包括对所选教材进行全面论证；选择编辑时力求达到专业对口；对排版、印制质量进行严格把关。对于英文教材中出现的错误，我们通过与作者联络和网上下载勘误表等方式，逐一进行了修订。

此外，我们还将与国外著名出版公司合作，提供一些教材的教学支持资料，希望能为授课老师提供帮助。今后，我们将继续加强与各高校教师的密切联系，为广大师生引进更多的国外优秀教材和参考书，为我国计算机科学教学体系与国际教学体系的接轨做出努力。

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Preface

The price break on the UNIX operating system for microcomputers and recent hardware advances have boosted the acceptance and popularity of UNIX for microcomputers. Consequently, there are students and novice UNIX users with computer skills but no experience with any operating system.

This book is for this group of users and students. It is neither an operating system book per se nor a UNIX reference book. It is a textbook written in a tutorial manner, intended as a teaching/learning tool in a classroom/lab environment. It is a book for introductory operating system courses. It discusses operating systems concepts in general, leading into a presentation of UNIX and the UNIX environment. It covers the topics necessary for the UNIX user to function independently and do most of the everyday, routine jobs. It also gives readers a good knowledge base so they can move on to more advanced courses or books.

I wrote this book relying mostly on my experience as a UNIX teacher. The organization of the chapters is what I follow, and the examples are what I usually use in my UNIX classes. This book is an introductory book, but not a simple book. I did not try to change the technical aspect of the material through storytelling, nor did I use irrelevant stories to make the material lighter or more interesting.

The chapters are short, and in cases where a topic requires more discussion, the material is presented in two chapters. The format of the chapters is kept the same as much as possible. However, consistency is sacrificed when the format is not appropriate for presenting the material.

Each chapter starts with a general explanation of concepts and topics. Simple concrete examples clarify the explanations or show how to use the commands and are followed by more detailed and complex commands and examples as the chapter progresses. Each chapter ends with questions, a review section, and, when appropriate or necessary, practical exercises for using a terminal are added.

Chapter 1 briefly describes the fundamentals of computer hardware and software and explains basic computer terms and concepts. It discusses the types of software and moves the emphasis to the system software. It explains the importance of the operating system and explores its primary functions.

Chapter 2 presents a brief history of the UNIX operating system. It explores the historical development of UNIX, discusses the major UNIX versions, and explains some of the system's important features.

Chapter 3 explains how to start and end a UNIX session. Simple UNIX commands are introduced, and their applications are explained. The process of establishing contact with UNIX is explored, and some internal UNIX operations are discussed.

Chapters 4 and 6 cover the UNIX operating system vi editor. After a brief discussion of the editors that are supported by UNIX, Chapter 4 introduces the vi editor, and presents the basic commands necessary for a simple editing job. Chapter 6 shows more of the vi editing power and flexibility by covering the more advanced vi commands and explains various ways the vi editor can be customized.

Chapter 5 is the first of two chapters that discuss the file structure of the UNIX system. It covers the basic concepts of files and directories and their arrangement in a hierarchical tree structure. It presents commands that facilitate the manipulation of the file system. Chapter 7 is the second chapter about the UNIX file system and its associated commands. It presents more file manipulation commands, explains the shell input/output redirection operators, and introduces file substitution metacharacters.

Chapter 8 covers the shell and its role in the UNIX system. It explains the shell features and capabilities, the shell variables, and the shell metacharacters. Startup files and process management under UNIX are also covered.

Chapter 9 concentrates on the UNIX communication utilities. It explains the UNIX e-mail facilities and shows the commands and options available. It discusses the shell and other variables that affect the e-mail environment. It shows how to make a startup file that customizes use of the e-mail utilities.

Chapter 10 discusses the essentials of program development. It explains the steps in the process of creating a program. It gives an example of a simple C program and walks through the process of writing the source code and creating an executable program.

Chapter 11 concentrates on shell programming. It explains the capabilities of the shell as an interpretive high-level language. It covers shell programming constructs and particulars. It shows the creation, debugging, and running of shell programs.

Chapter 12 builds on the commands and concepts of the previous chapter and covers more of the shell programming commands and techniques. It also presents a simple application program and shows the process of developing programs using the shell language.

Chapter 13 presents a few additional important UNIX commands. Disk commands, file manipulation commands, and security are the major topics of this chapter.

New to This Edition

I have received suggestions from my colleagues and from professors who have adopted this textbook to add other topics, UNIX capabilities, and features in this edition. On the other hand, I also have received suggestions to keep this textbook as is. You realize my dilemma. However, I made the decision to keep the book's structure and level as in previous editions and not to create a thousand-page cover-it-all reference book.

This fourth edition of *UNIX Unbounded: A Beginning Approach* includes commands from the Linux operating system and its Bourne Again shell *(bash)*. Some inconsistencies have been removed. All known typos and errors have been corrected. All programs have been tested using different shells. The end-of-the-chapter exercises and terminal sessions have been reviewed and new questions and exercises have been added.

Resources

An instructor's manual (ISBN 0-13-092737-6) is available for this book. It includes lecture notes on each chapter, answers to review questions at the end of each chapter, and test questions for assistance in preparing examinations on the material in this book. The following teaching resources are also available: Blackboard, ISBN 0-13-049828-9; Course Compass, ISBN 0-13-049829-7; Test Manager, ISBN 0-13-049826-2; and PowerPoint masters of figures in the text, ISBN 0-13-049820-3.

Acknowledgments

This fourth edition of *UNIX Unbounded* would not have been possible without the help of my colleagues in academia and industry. I am grateful to all of them.

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Thanks to Tom Swanson, my co-author of the upcoming book *UNIX Administration Unbounded,* for being the guru that he is, and being so generous with his time.

Thanks to Charles Stewart at Prentice Hall for his patience and continued support of my writing projects.

How to Read This Book

If this is the first time you are learning about the UNIX operating system, I suggest that you start with the first chapter and continue working through the chapters in the sequence in which they are presented. If you already know some aspects of the UNIX operating system, I suggest that you browse through topics you know and review the main points to help you understand the other chapters. Most of the chapters are interrelated in the sense that your skills from the previous chapter help you—and sometimes are necessary for you—to go to the next one.

A number of concrete examples clarify concepts or show different ways you can use a command. I encourage you to try them on your system. UNIX comes in many dialects and is also easily modifiable. This means you may find discrepancies between the manual and your system, and some of the screen displays or command sequences in this book may not exactly match those on your system.

Typographical Notes

Throughout this book, certain words are emphasized by using different typefaces. In the running text, **bold** words are UNIX commands or specific characters that you type on the keyboard as part of an example; `sans serif` words are directory names, pathnames, or filenames; and *italic* words are keywords or terms being introduced for the first time.

The following shows an example of a terminal screen. This is what you expect to see on your system when you practice the commands:

```
UNIX System V release 4.0
login: david
password:
```

The following is an example of the command sequences. Characters you type on the keyboard are indicated in **bold** type. The information on the right is a commentary on the action being performed on the left. This format is used when a line-by-line explanation of the commands or outputs is necessary.

```
$ pwd [Return]  . . . . . Check your current directory.
    /usr/david  . . . . . You are in david.
$ cd source [Return]  . . . . . Change to source directory.
```

Icons

Icons are used throughout the text to draw your attention, list some features, or present action to be taken. Four icons are used throughout the text.

Note

- Lists the important points
- Draws your attention to a particular aspect of a command or a screen display

Flag

- Draws your attention (flags you) to common user mistakes
- Warns you of the consequences of your action

Computer

- Shows how the commands work on the system
- Lets you try the commands on your system

Box

- Shows a sequence of keys that you must press to perform a specified task

Keyboard Conventions

[**Return**]: This represents the Return key, sometimes called CR (for carriage return) or the Enter key. You usually press this key at the end of your command or input line.

[**Ctrl-d**]: This means you should simultaneously hold down the key labeled Ctrl (for Control) and press letter d key. Other control characters that consist of the Ctrl key and a letter are shown similarly.

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