国外计算机科学教材系列

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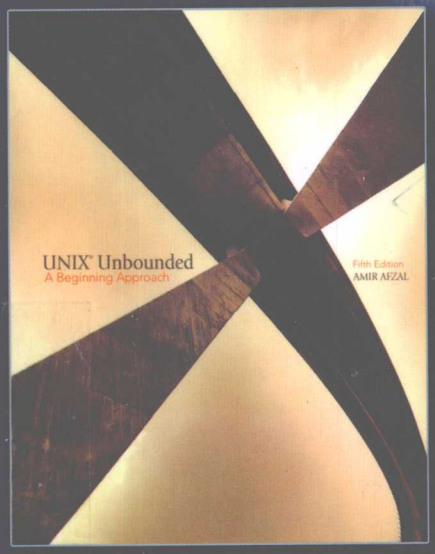
UNIX初级教程

（第五版）

UNIX Unbounded: A Beginning Approach
Fifth Edition



英文版

[美] Amir Afzal 著

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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的系统概念及其命令的使用，阐述的内容都是针对初学者完成日常工作所必需的各个方面，涉及UNIX系统的常用命令、UNIX文件系统、vi编辑器和Emacs编辑器、UNIX通信工具、shell命令和程序开发，以及一些更为深入的UNIX命令。书中还介绍了Linux操作系统以及Bourne Again Shell命令等。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，并且避免了直接罗列复杂的命令格式。

本书可作为UNIX课程的教学用书或参考书，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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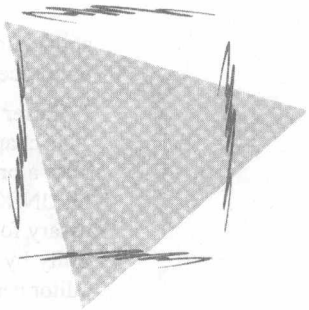

Preface

The price break on the UNIX operating system for microcomputers and hardware advances has boosted the acceptance and popularity of UNIX and Linux systems for microcomputers. There are students and computer users with computer skills but no experience with the UNIX operation system. This book is for this group of students and users.

This book 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. This is an introductory book but not a simple book. It covers the topics necessary for UNIX users to function independently and do most of the everyday, routine tasks. It also provides sufficient level of UNIX knowledge for readers so they can move on to more advanced books and to feel confident to use UNIX reference books.

I wrote this book relying mostly on my experience as a UNIX instructor. The organization of the chapters is what I follow, and examples are what I use in my UNIX classes. 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 and concrete examples clarify the explanations and show how to use the commands. They are followed by more detailed and complex commands and examples as the chapter progresses. Each chapter ends with review questions and, when appropriate or necessary, practical exercises for hands-on practice are added.

Chapter 1: First Things First
This chapter 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: The UNIX Operating System
This chapter explores the historical development of UNIX, discusses the major UNIX versions, and explains some of the UNIX system's important features.

Chapter 3: Getting Started
This chapter explains how to start and end a UNIX session. UNIX commands such as changing password and displaying the system's time/date are introduced, and their

applications are explained. The process of establishing contact with UNIX (login/log out process) is explored, and some internal UNIX operations are discussed.

Chapter 4: The vi Editor: First Look
This chapter and Chapter 6 cover the UNIX operating system vi editor. Chapter 4 starts with a brief discussion of the editors in general and then the editors that are supported by UNIX are introduced. It explains the vi editor and presents the basic commands necessary for simple editing jobs. Chapter 6 shows more of the vi editing power and flexibility by covering the more advanced commands and explains the various ways the vi editor can be customized.

Chapter 5: Introduction to the UNIX File System
This chapter is one of the two chapters that explain the file structure of the UNIX operation system. It covers the basic concepts of files and directories and their arrangement in a hierarchical tree structure. It presents the commands that facilitate the manipulation of the file system. It covers enough commands to facilitate the usage of some of the commands in the next vi editor chapter.

Chapter 6: The vi Editor: Last look
This chapter covers the more advanced commands of the vi editor. It explains the ways to customize the vi editor environment, open more than one file for editing, using buffers, and executing UNIX commands while in vi editor.

Chapter 7: The Emacs Editor
Note: This chapter is placed here to be used instead of or in addition to Chapter 6. The vi editor is emphasized because it is supported and supplied with many UNIX versions and variations. However, many UNIX users prefer the Emacs editor. It is easy to obtain a copy of Emacs if it is not available on the system. The goal is to provide an alternative to the vi editor.

This chapter covers the Emacs editor. It starts with the fundamental concepts and commands and covers the Emacs features to the extent that is necessary for the everyday user. The help feature is introduced early in the chapter to be used for obtaining information/explanations about the commands and options not covered here.

Chapter 8: The UNIX File System Continued
This chapter is the second chapter about the UNIX file system and its related commands. Chapter 8 is the second chapter that covers the rest of the UNIX file system commands. It presents more file manipulation commands, explains the shell input/output redirection operators and introduces the file substitution metacharacters.

Chapter 9: Exploring the Shell
This chapter covers the shell and its role in the UNIX system. It explains the shell usage, features and capabilities. The shell variables and metacharacters are explained. Startup files and process management under UNIX are also covered.

Chapter 10: UNIX Communication
This chapter concentrates on the UNIX communication utilities. It explains the UNIX email facilities and shows the available commands and options. It discusses the shell and other variables that affect the email environment. It shows how to write a startup file to customize the using of the email utility.

Chapter 11: Program Development
This chapter covers the essentials of the software development. It explains the steps in the process of creating a program. It provides an example of a simple C++ program and walks through the process of writing the source code, compiling, and creating an executable program.

Chapter 12: Shell Programming
This chapter concentrates on shell programming. It explains the capabilities of the shell as an interpretative high-level language. It covers shell programming constructs and particulars. It shows the creation, debugging, and running of shell programs.

Chapter 13: Shell Scripts: Writing Applications
This chapter builds on the commands and concepts of the previous chapter and covers more of the shell programming commands and techniques. It presents an application program and shows the process of developing programs using the shell language.

Chapter 14: Farewell to UNIX
This chapter covers additional UNIX commands. It is dedicated to the stand-alone commands and topics that for one reason or another didn't fit in the previous chapters. Disk and file manipulation commands, remote computing commands, and security are major topics of this chapter.

Acknowledgments

This fifth 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.

Thanks to students in my C/C++ and UNIX classes for their suggestions and feedback.

Thanks to my colleagues at Strayer University, where I teach.

Thanks to my colleagues at General Dynamics, where I work.

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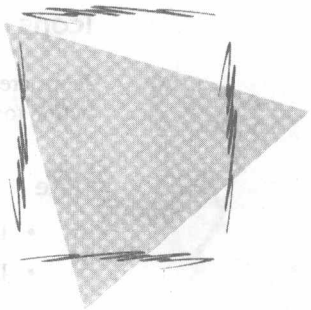


How to Read This Book

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 modified. This means you may find discrepancies between this book 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 UNIX system
- Lets you try the commands on your UNIX system

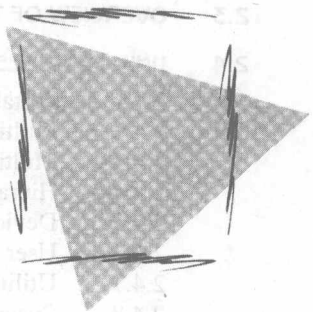
Box

- 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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