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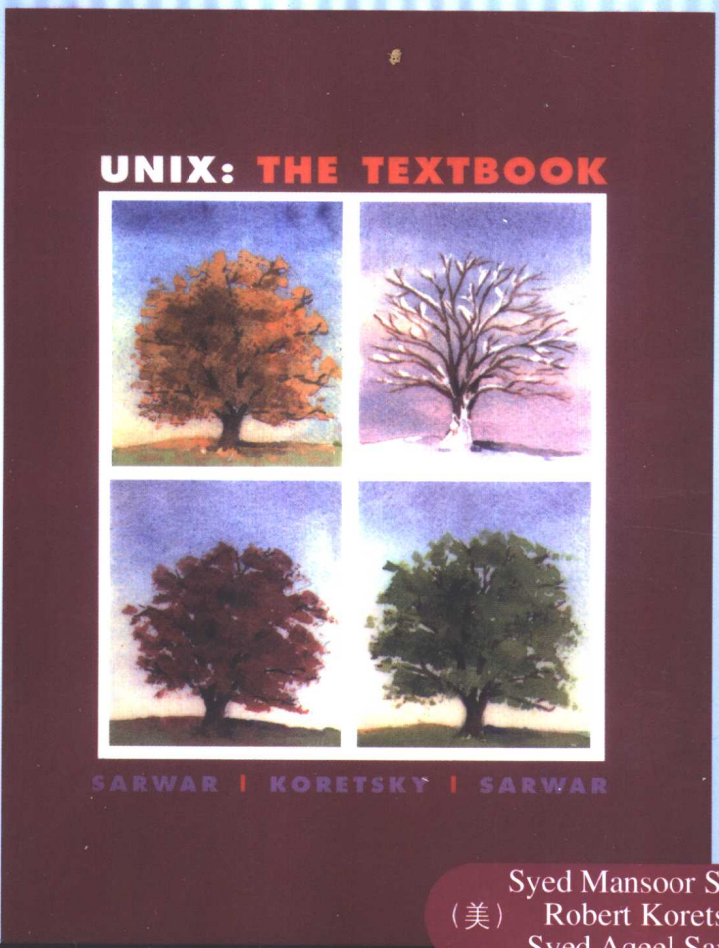
UNIX操作系统教程

（英文版）



Syed Mansoor Sarwar
（美） Robert Koretsky 著
Syed Aqeel Sarwar

机械工业出版社
China Machine Press

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出版者的话

文艺复兴以降，源远流长的科学精神和逐步形成的学术规范，使西方国家在自然科学的各个领域取得了垄断性的优势；也正是这样的传统，使美国在信息技术发展的六十多年间名家辈出、独领风骚。在商业化的进程中，美国的产业界与教育界越来越紧密地结合，计算机学科中的许多泰山北斗同时身处科研和教学的最前线，由此而产生的经典科学著作，不仅擘划了研究的范畴，还揭橥了学术的源变，既遵循学术规范，又自有学者个性，其价值并不会因年月的流逝而减退。

近年，在全球信息化大潮的推动下，我国的计算机产业发展迅猛，对专业人才的需求日益迫切。这对计算机教育界和出版界都既是机遇，也是挑战；而专业教材的建设在教育战略上显得举足轻重。在我国信息技术发展时间较短、从业人员较少的现状下，美国等发达国家在其计算机科学发展的几十年间积淀的经典教材仍有许多值得借鉴之处。因此，引进一批国外优秀计算机教材将对我国计算机教育事业的发展起积极的推动作用，也是与世界接轨、建设真正的世界一流大学的必由之路。

机械工业出版社华章图文信息有限公司较早意识到“出版要为教育服务”。自1998年始，华章公司就将工作重点放在了遴选、移译国外优秀教材上。经过几年的不懈努力，我们与Prentice Hall，Addison-Wesley，McGraw-Hill，Morgan Kaufmann等世界著名出版公司建立了良好的合作关系，从它们现有的数百种教材中甄选出Tanenbaum，Stroustrup，Kernighan，Jim Gray等大师名家的一批经典作品，以“计算机科学丛书”为总称出版，供读者学习、研究及庋藏。大理石纹理的封面，也正体现了这套丛书的品位和格调。

“计算机科学丛书”的出版工作得到了国内外学者的鼎力襄助，国内的专家不仅提供了中肯的选题指导，还不辞劳苦地担任了翻译和审校的工作；而原书的作者也相当关注其作品在中国的传播，有的还专诚为其书的中译本作序。迄今，“计算机科学丛书”已经出版了近百个品种，这些书籍在读者中树立了良好的口碑，并被许多高校采用为正式教材和参考书籍，为进一步推广与发展打下了坚实的基础。

随着学科建设的初步完善和教材改革的逐渐深化，教育界对国外计算机教材的需求和应用都步入一个新的阶段。为此，华章公司将加大引进教材的力度，在“华章教育”的总规划之下出版三个系列的计算机教材：针对本科生的核心课程，剔抉外版菁华而成“国外经典教材”系列；对影印版的教材，则单独开辟出“经典原版书库”；定位在高级教程和专业参考的“计算机科学丛书”还将保持原来的风格，继续出版新的品种。为了保证这三套丛书的权威性，同时也为了更好地为学校和老师们服务，华章公司聘请了中国科学院、北京大学、清华大学、国防科技大学、复旦大学、上海交通大学、南京大学、浙江大学、中国科技大学、哈尔滨工业大学、西安交通大学、中国人民大学、北京航空航天大学、北京邮电大学、中山大学、解放军理工大学、郑州大学、湖北工学院、中国国家信息安全测评认证中心等国内重点大学和科研机构在计算机的各个领域的著名学者组成“专家指导委员会”，为我们提供选题意见和出版监督。

“经典原版书库”是响应教育部提出的使用原版国外教材的号召，为国内高校的计算机教学度身订造的。在广泛地征求并听取丛书的“专家指导委员会”的意见后，我们最终选定了这30多种篇幅内容适度、讲解鞭辟入里的教材，其中的大部分已经被M.I.T.、Stanford、U.C. Berkley、C.M.U.等世界名牌大学采用。丛书不仅涵盖了程序设计、数据结构、操作系统、计算机体系结构、数据库、编译原理、软件工程、图形学、通信与网络、离散数学等国内大学计算机专业普遍开设的核心课程，而且各具特色——有的出自语言设计者之手、有的历三十年而不衰、有的已被全世界的几百所高校采用。在这些圆熟通博的名师大作的指引之下，读者必将在计算机科学的宫殿中由登堂而入室。

权威的作者、经典的教材、一流的译者、严格的审校、精细的编辑，这些因素使我们的图书有了质量的保证，但我们的目标是尽善尽美，而反馈的意见正是我们达到这一终极目标的重要帮助。教材的出版只是我们的后续服务的起点。华章公司欢迎老师和读者对我们的工作提出建议或给予指正，我们的联系方法如下：

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PREFACE

THE MATURING SUBJECT

Certainly a measure of the maturity of any technical subject matter is how assimilated and formalized it becomes in the structure of the discipline that gave birth to it. From perhaps an esoteric and theoretical (even idiosyncratic) start, useful scientific knowledge follows a course upward to become a standard, codified, and above all, practical universal discourse. The functional mechanisms that nurture this development have always been an integral part of the scientific community at large.

WHY WE WROTE THIS BOOK

UNIX has reached that level of maturity in the computer science and engineering fields, as witnessed by our writing of this textbook, which we felt was long overdue. Together, we have more than 30 years of practical teaching experience at the college level. Our initial concept for this book grew out of our unwillingness to use either the large, intractable UNIX reference sources or the short, "UNIX-for-Idiots" guides to teach meaningful, complete, and relevant introductory classes on the subject. Moreover, a textbook approach, with pedagogy incorporating in-chapter tutorials and exercises, as well as useful problem sets at the end of each chapter, allows us to present all the important UNIX topics for a classroom lecture-laboratory-homework presentation.We can achieve this presentation in a manner that is optimal for learning (i.e., well-thought-out sequencing of topics, well-developed and timely lessons, laboratory work, and homework exercises/problems synchronized with the sequencing of chapters in the book). Additionally, because of the depth and breadth of coverage of these topics, anyone interested in furthering their professional knowledge of the subject matter will also find this textbook useful.

THE PURPOSES OF THIS BOOK

Our primary purpose is to describe to readers the UNIX application user's interface (AUI) and to do it in a way that gives the reader insight into the inner workings of the system, along with some important UNIX concepts, data structures, and algorithms. Notable examples are the UNIX file and process concepts and I/O redirection. The secondary purpose of this textbook is to describe some important UNIX software engineering tools for developers of C software and shell scripts. However, we do not describe the UNIX applications programmer's interface (API) in terms of C libraries and UNIX system calls. In writing this textbook we assumed no previous knowledge of UNIX or programming on the part of the reader.

The Presentation Format

The book is laced with many diagrams and tables, hundreds of in-chapter tutorials and interactive shell sessions, in-chapter exercises, and end-of-chapter problems. A syntax box for every command, tool, and application covered describes the syntax of the command, its purpose, the output produced by the command, and its useful options and features. In addition, every chapter contains a summary of the material covered in the chapter.

Pathways Through the Text

If this book is to be used as the main text for an introductory course in UNIX, all the chapters should be covered, with the possible exception of Chapter 20. If the book is to be used as a companion to the main text in an operating systems concepts and principles course, the coverage of chapters would be dictated by the order in which the main topics of the course are covered but should include Chapters 7, 12, and 13. *For use in a C or Shell programming* course, Chapters 7–20 and relevant sections of Chapters 3–6 would be a great help to students. The extent of coverage of Chapter 20 would depend on the nature of the course—partial coverage in an introductory and full coverage in an advanced course.

The Design of Fonts

The following typefaces have been used in the book for various types of text items.

Typeface	Text Type
Boldface Roman	Keywords
`Boldface Monospace`	Any character or string typed at the keyboard (commands, shell variables, and user input)
`Monospace`	Commands, tools, applications, and their options in the text
Italic	A word being used as a word and text being emphasized
Roman	Everything else, including file pathnames

The keyboard presses are enclosed in angle brackets (e.g., <Enter> and <Ctrl-D>). The instruction "press <Ctrl-D>" means to hold the <Ctrl> key down while pressing the <D> key. This instruction is also denoted ^D.

Supplements

A comprehensive and informational Web site containing solutions to the In-Chapter Exercises, source code, and further references and links to other UNIX sites can be found at http://lhotse.up.edu/. Also, you can link to this site from the Addison Wesley Web Site at www.awl.com/cseng/titles/0-201-61260-7. Solutions to the Problems at

the end of each chapter are available exclusively to professors using this book to teach a course. For information on obtaining these solutions, please contact your local Addison-Wesley sales representative.

We take full responsibility for any errors in the book. You can send your error reports and comments to us at sarwar@egr.up.edu (or sarwar@up.edu) and bobk@egr.up.edu (or bobk@up.edu). We will incorporate your feedback and fix any errors in subsequent printings.

ACKNOWLEDGEMENTS

We started writing this textbook from scratch during the second week of May 1999 and finished reviewing the final draft with page numbers by the end of the third week of May 2000. Completing such a large project in such a short time is not possible without the help of many.

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