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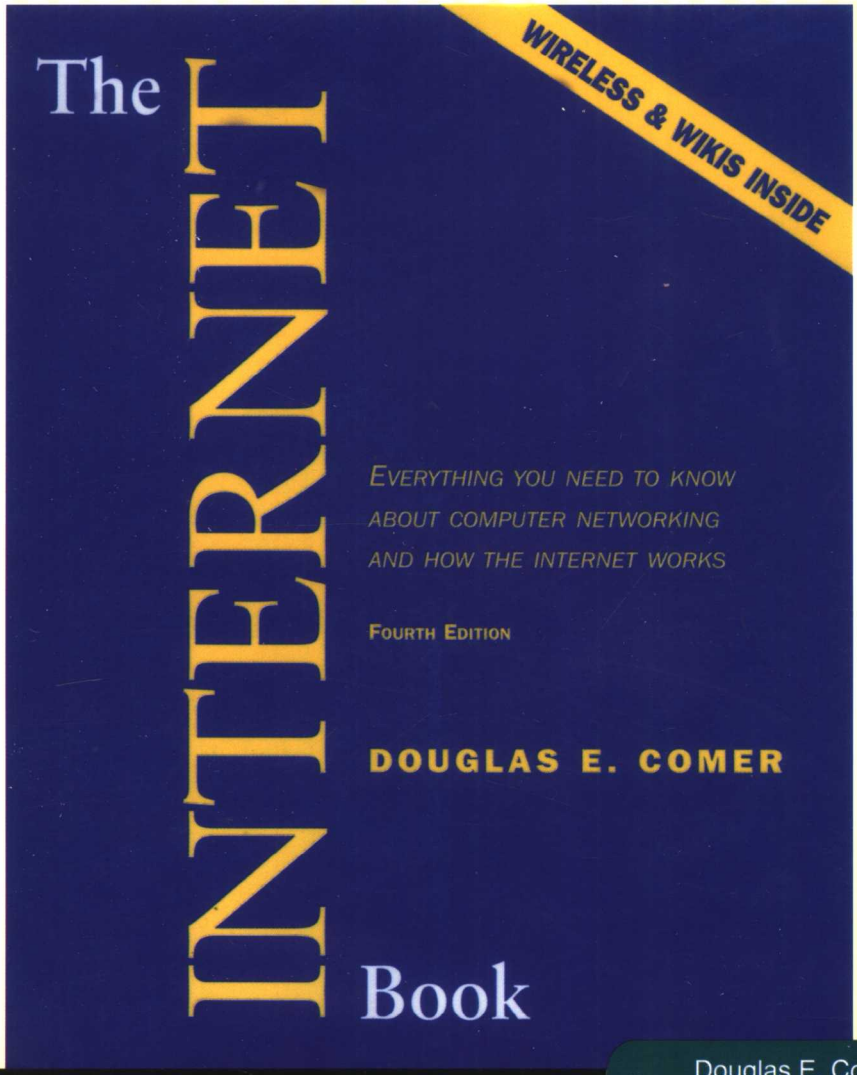
（英文版 · 第4版）



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（英文版 · 第4版）

The Internet Book
Everything You Need to Know About Computer Networking and How the Internet Works
(Fourth Edition)

江苏工业学院图书馆
藏书章

(美) Douglas E. Comer
Cisco公司副总裁&普度大学教授 著

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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年开始，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，有的还专程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：除“计算机科学丛书”之外，对影印版的教材，则单独开辟出“经典原版书库”；同时，引进全美通行的教学辅导书“Schaum's Outlines”系列组成“全美经典学习指导系列”。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。

这三套丛书是响应教育部提出的使用外版教材的号召，为国内高校的计算机及相关专业的教学度身订造的。其中许多教材均已为M. I. T., Stanford, U.C. Berkeley, C. M. U. 等世界名牌大学所采用。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、有的历经三十年而不衰、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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To Everyone Who
Is Curious

Preface

The Internet Book explains how computers communicate, what the Internet is, how the Internet works, and what services the Internet offers. It is designed for readers who do not have a strong technical background — early chapters clearly explain the terminology and concepts needed to understand all the services. When you finish reading, you will understand the technology behind the Internet, will appreciate how the Internet can be used, and discover why people find it so exciting. In addition, you will understand the origins of the Internet and see how rapidly it has grown.

Instead of using mathematics, algorithms, or computer programs, the book uses analogies from everyday life to explain technology. For example, to explain why digital communication is superior to analog, the text uses an analogy of sending signals through fog with a flashlight. To explain how audio can be played back for the user at a steady rate when packets arrive in clumps, the text uses the analogy of many gallons of milk arriving at a supermarket in one shipment, but being sold one gallon at a time.

In addition to explaining the services users encounter such as email, file download, instant messaging, and web browsing, the text covers key networking concepts such as packet switching, Local Area Networks, protocol software, and domain names. More important, the text builds on fundamentals — it describes basic Internet communication facilities first, and then shows how the basic facilities are used to provide a variety of services. Finally, the book includes an extensive glossary of technical terms with easy-to-understand definitions; readers are encouraged to consult the glossary as they read.

The fourth edition retains the same general structure as the previous edition, but adds three new chapters (19, 26, and 32), and updates material throughout. Chapter 19 explains NAT, a technology many Internet subscribers now have in their home. Chapter 26 explains blogs and wikis, two new Internet applications. Chapter 32, the third new chapter, explains Virtual Private Networking, a technology that allows an employee to access a corporate network safely from an arbitrary remote location.

As with the previous edition, the book is divided into four main parts. The first part begins with fundamental concepts such as digital and analog communication. It also introduces packet switching and explains the Local Area Network technologies that are used in most businesses.

The second part of the book gives a short history of the Internet research project and the development of the Internet. Although most of the history can be skipped, readers should pay attention to the phenomenal growth rate, which demonstrates that the technology was designed incredibly well — no other communication technology has remained as unchanged through such rapid growth.

The third part of the book explains how the Internet works, including a description of the two fundmental protocols used by all services: the Internet Protocol (IP) and the Transmission Control Protocol (TCP). Although they omit technical details, the chapters in this part allow students to understand the essential role of each protocol and gain perspective on the overall design.

The fourth part of the book examines services available on the Internet. In addition to covering browsers, web documents, and search engines used with the World Wide Web, chapters discuss email, bulletin boards, file transfer, remote desktops, wikis, blogs, and audio and video communication. In each case, the text explains how the service operates and how it uses facilities in the underlying system. The fourth part concludes with a discussion of network security, Virtual Private Networks, and electronic commerce.

The Internet Book makes an excellent reference text for a college-level course on the Internet. Although presented in a nontechnical manner, the material is scientifically accurate. More important, in the twenty-first century, an educated person will need to know more than how to use a browser or set up a web page — they should have some understanding of what goes on behind the scenes. They can acquire such knowledge from this text.

Instructors are encouraged to combine classroom lectures with laboratory sessions in which students see and use the technology first-hand. In all courses, early labs should focus on exploring a variety of services, including sending email, using a browser, using a search engine, downloading files, listening to audio, and using an IP telephone, if one is available. I encourage all students, even those who have no interest in computers, to build a trivial web page by hand. In addition to helping them see the relationship between tags in an HTML document and the resulting display, it shows students how a server transfers files on a computer disk to a browser. Seeing the relationship in labs helps one better understand as they read about the underlying process.

Lab projects later in the semester depend on the type of course. Business-oriented courses often focus students on using the Internet or constructing a case study — labs require students to search the Internet for information and then write a paper that analyzes the information. Other courses use labs to focus on tools such as programs used to create a web page. Some courses combine both by having students search for information and then create a web page that contains links to the information. In any case, we have found that students enter Internet courses with genuine enthusiasm and

motivation; a professor's task is merely to provide perspective and remind students throughout the semester why the Internet is so exciting.

The author thanks many people who have contributed to editions of this book. John Lin, Keith Rovell, Rob Slade, and Christoph Schuba read early versions and made suggestions. Dwight Barnette, George Polyzo, Donald Knudson, Dale Musser, and Dennis Ray sent the publisher reviews of a previous edition. Scott Comer provided perspective. As always, my wife, Christine, carefully edited the manuscript, solved many problems, and improved the wording.

Douglas E. Comer

August, 2006

About The Author

Douglas Comer is a Distinguished Professor of Computer Science at Purdue University and Vice President of Research at Cisco Systems, Incorporated. He has taught undergraduate and graduate courses on computer networks and Internets, operating systems, computer architecture, and computer software. One of the researchers who contributed to the Internet as it was being formed in the late 1970s and 1980s, he has served as a member of the Internet Architecture Board, the group responsible for guiding the Internet's development. Comer is an internationally recognized expert on computer networking, the TCP/IP protocols, and the Internet, who presents lectures to a wide range of audiences. In addition to research articles, he has written a series of textbooks that describe the technical details of the Internet. Comer's books have been translated into 16 languages, and are used in industry as well as computer science, engineering, and business departments around the world. He is a Fellow of The Association for Computing Machinery (the major professional society in computer science) and editor of the scientific journal, *Software — Practice and Experience.*

Professor Comer had dial-up Internet access from his home in the late 1970s, has enjoyed a direct connection with twenty-four hour per day service since 1981, and uses the Internet daily. He wrote this book as a response to everyone who has asked him for an explanation of the Internet that is both technically correct and easily understood by anyone. An Internet enthusiast, Comer displays *INTRNET* on the license plate of his car.

Additional information can be found at:

www.cs.purdue.edu/people/comer

and information about Comer's books can be found at:

www.comerbooks.com

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