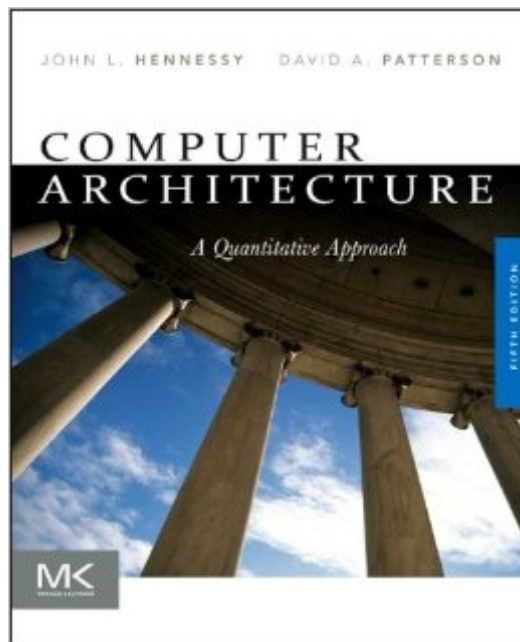


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# Computer Architecture: A Quantitative Approach (The Morgan Kaufmann Series In Computer Architecture And Design)



## Synopsis

Computer Architecture: A Quantitative Approach explores the ways that software and technology in the cloud are accessed by digital media, such as cell phones, computers, tablets, and other mobile devices. The book became a part of Intel's 2012 recommended reading list for developers, and it covers the revolution of mobile computing. The text also highlights the two most important factors in architecture today: parallelism and memory hierarchy. The six chapters that this book is composed of follow a consistent framework: explanation of the ideas in each chapter; a "crosscutting issues" section, which presents how the concepts covered in one chapter connect with those given in other chapters; a "putting it all together" section that links these concepts by discussing how they are applied in real machine; and detailed examples of misunderstandings and architectural traps commonly encountered by developers and architects. The first chapter of the book includes formulas for energy, static and dynamic power, integrated circuit costs, reliability, and availability. Chapter 2 discusses memory hierarchy and includes discussions about virtual machines, SRAM and DRAM technologies, and new material on Flash memory. The third chapter covers the exploitation of instruction-level parallelism in high-performance processors, superscalar execution, dynamic scheduling and multithreading, followed by an introduction to vector architectures in the fourth chapter. Chapters 5 and 6 describe multicore processors and warehouse-scale computers (WSCs), respectively. This book is an important reference for computer architects, programmers, application developers, compiler and system software developers, computer system designers and application developers. Part of Intel's 2012 Recommended Reading List for Developers Updated to cover the mobile computing revolution Emphasizes the two most important topics in architecture today: memory hierarchy and parallelism in all its forms. Develops common themes throughout each chapter: power, performance, cost, dependability, protection, programming models, and emerging trends ("What's Next") Includes three review appendices in the printed text. Additional reference appendices are available online. Includes updated Case Studies and completely new exercises.

## Book Information

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## Customer Reviews

Computer architecture has seen vast changes in the last 20 years, and fortunately, H&P somehow manage to do a new edition about every 5 years, often enough to stay current. When the First Edition appeared, it quickly became \*the\* standard textbook on the topic, to be replaced in that role by each successive edition. Computer architectures complexify over time, and so do books. The Third Edition was about 1100 pages long. The Fourth has been shrunk back to something more manageable by moving subsidiary details to a CD included with the book. This edition is well worth having, even if one already has the earlier ones. In particular, the additional material on multiprocessors is especially welcome, given that it has become much more difficult to speed up uniprocessors. Most people who work in or near computer systems architecture know these books, but I have often recommended them to others, such as technology journalists, venture capitalists, and financial analysts, i.e., people who are rarely computer architects, but need to understand computer technology and its trends. Many such have been surprised to find the book was useful to them. H&P write very clearly, and each chapter outlines its key concepts for a topic, then works down to detailed analyses, and then comes back up to summarize. Hence, I've often recommended to people: 1) Read the first few sections of each chapter. 2) In each remaining section per chapter, read until the going gets heavy, then skip to the next section. In some cases, this will happen after reading the first paragraph, but don't worry, the writing will return to a higher level. 3) Read "Concluding Remarks" and any "Fallacies and Pitfalls" or "Historical Perspectives" sections at the end of a chapter. Anyway, I expect this Edition will be just as indispensable as the earlier ones.

It appears that this book was rushed out by the publisher, \*unfinished\*. Core subjects that would

normally be chapters in other books, such as "Computer Arithmetic", "Storage Systems", "Large-scale multiprocessors", "Survey of Instructions Set", etc (nine chapters in total ), have been relegated to an "Online Appendices" status, which is a misnomer because as of 2011/10/20 they don't exist at all, even online (a terse "coming soon" appearing on the website). My suggestions: don't buy the book now, wait until the missing chapters are published and appears in print in the book itself. If you buy the book now, you will only be able to read a lot of chapters as ".pdf" when they get published, not a pleasant experience in my opinion, and you will also contribute to encourage publishers in this bad practice. To give you an idea of how bad it is, the number of non-printed chapters (9) is the same as the number of printed chapters (6 + 3 "appendices") and if we can trust the authors themselves: "There are more pages in these appendices (the non-printed ones) than there is in this book" (preface p xvi) ![Update: 2011/11/01: the appendices are now present on the books web site in pdf. But still no printed paper version of the appendices available or announced]

The first and second editions described how to evaluate and determine what gives systems performance advantages over others. They got down to the real nuts and bolts of a system and described what made one optimal over others. Recent editions seem to be promoting current trends and technologies. I think one of the reasons for more editions in shorter periods of time is because a lot of the technologies they are examining don't have any real substance or staying power. The other reason I have been staying away from using recent releases is the reliance on web content. If I buy or recommend a book I expect it to be a whole book and not half of it dependent on web content that can disappear at a moments notice. If I wanted to recommend a website I will recommend a website and NOT a book. What would be nice is if they got back to the basics of what really makes one system more optimal, faster, than another with a historical perspective. Why computer architecture evolved following one path over another.

I had this book for a graduate course in computer science, and after having been through it, I can say several parts of it are in major need of a rewrite. To be fair, a lot of the material was engaging, and even fun to read; but the layout was so awful that much of what they were saying couldn't be understood by someone not already familiar with the subject without wading through the appendices. In their defense, it is the fourth edition of the book, and the technology has changed much since its inception, so the format is going to be a little messed up. This is also likewise a major strike against them in the area of the exercises: Many of them are very badly written, have little to

no relation to what is actually taught in the text, and are fraught with obvious errors that should have been caught two editions ago. On a few of them, even our instructor (who is very knowledgeable) had to throw up his hands and declare that it was anyone's guess. All in all, this text has a lot good information and potential, but badly needs revision and restructuring if it's to be a truly great learning tool.

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