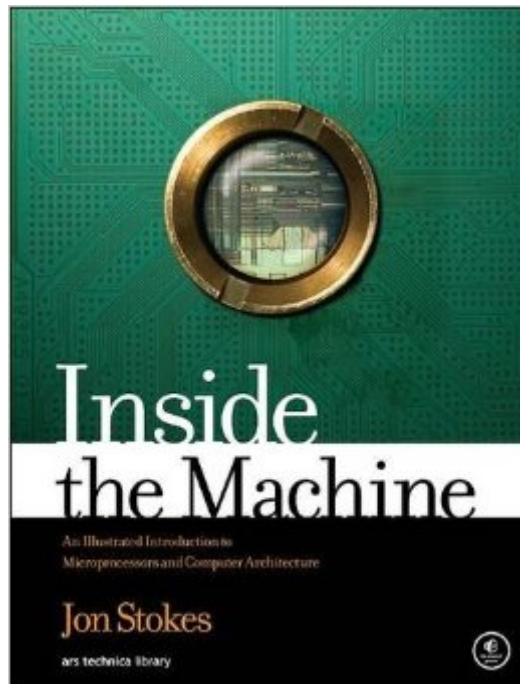# Inside The Machine: An Illustrated Introduction To Microprocessors And Computer Architecture

Synopsis

This is a softcover version of the original hardcover edition released December 28, 2006 (ISBN 9781593271046).Computers perform countless tasks ranging from the business critical to the recreational, but regardless of how differently they may look and behave, they're all amazingly similar in basic function. Once you understand how the microprocessor-or central processing unit (CPU)-works, you'll have a firm grasp of the fundamental concepts at the heart of all modern computing.Inside the Machine, from the co-founder of the highly respected Ars Technica website, explains how microprocessors operate-what they do and how they do it. Now in softcover, the book uses analogies, full-color diagrams, and clear language to convey the ideas that form the basis of modern computing. After discussing computers in the abstract, the book examines specific microprocessors from Intel, IBM, and Motorola, from the original models up through today's leading processors. It contains the most comprehensive and up-to-date information available (online or in print) on Intel's latest processors: the Pentium M, Core, and Core 2 Duo. Inside the Machine also explains technology terms and concepts that readers often hear but may not fully understand, such as "pipelining," "L1 cache," "main memory," "superscalar processing," and "out-of-order execution."Includes discussion of:Parts of the computer and microprocessorProgramming fundamentals (arithmetic instructions, memory accesses, control flow instructions, and data types)Intermediate and advanced microprocessor concepts (branch prediction and speculative execution)Intermediate and advanced microprocessor concepts (branch prediction and speculative execution)Intermediate and advanced computing concepts (instruction set architectures, RISC and CISC, the memory hierarchy, and encoding and decoding machine language instructions)64-bit computing vs. 32-bit computingCaching and performanceInside the Machine is perfect for students of science and engineering, IT and business professionals, and the growing community of hardware tinkerers who like to dig into the guts of their machines.

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Customer Reviews

This book is an introduction to computers that fills the gap between classic and challenging books like Hennesy and Patterson's, and the large number of "How Your Computer Works" books that are too basic for engineers.The first four chapters lay the conceptual groundwork for later chapters' studies of real-world microprocessors. These chapters use a simplified example processor, the DLW, to illustrate basic and intermediate concepts like the instructions/data distinction, assembly language programming, superscalar execution, pipelining, the programming model, and machine language. This section is essential reading for those who are new to the world of microprocessors.The middle section of the book consists of detailed studies of two popular desktop processor lines: the Pentium line from Intel and the PowerPC from IBM and Motorola. These chapters walk the reader through the chronological development of each processor line, describing the evolution of the microarchitectures and instruction set architectures under discussion. Along the way, more advanced concepts such as speculative execution, vector processing, and instruction set translation are introduced and explored via a discussion of one or more real microprocessors. Throughout the middle part of the book the approach is to explain each new processor's features in terms of how they differ from analogous features found in predecessors or competitors. The comparative part of the book culminates in chapters 7 and 8 which consists of detailed comparisons of two starkly different and important processors: Intel's Pentium 4 and Motorola's MPC7450, popularly known as the G4e.

Jon Stokes' Inside the Machine falls somewhere between Computer Science textbook and Popular Science reading. It's packed with a lot of information that is very technical, while not quite going to the technical depth of a classroom textbook. It does make heavy use of analogy to render some hard to grasp concepts a bit easier for the non CS major.Inside the Machine is fairly dense with both content and color. Lots of information is available here with colorful diagrams and illustrations to back it up. You'll need a more than basic understanding of computers and at least a bit of programming experience under your belt to get the most out of it. With that, the average computer

enthusiast can pick up this book and find themselves in possession of a clear and concise guide to basic processor theory and real processor architecture. if you are interested in how microprocessors really work and why they were developed as they were but not interested in obtaining a CS degree this book is your first, best stop.The book is divided into 12 chapters, with a bibliography and index following. The first four chapters lead the reader through basic computing concepts, discussing how a program actually executes when it arrives at the processor and brings us through pipelined and superscalar execution, ways to increase speed and throughput of processors.Once a basic understanding of how the microprocessor works is reached, Stokes then disects a number of popular processors that have existed in the last decade and a half. These chapters cover the Intel's Pentium and Pentium Pro, the 600. 700 and 7400 Power PC processors, Intel's P4 vs Motorola's G4, 64-bit and x86-64 processors, the G5 and IBM's PowerPC 970 and finally Intel's Pentium M, Core Duo and Core 2 Duo processors.

It's possible to say you know how your computer works. But do you really know how your microprocessor does what it does? Without forcing you to take a crash course in engineering, Jon Stokes does a great job in uncovering the mysteries in the book Inside the Machine: An Illustrated Introduction to Microprocessors and Computer Architecture. It's an excellent read if you want to know what happens after you press the power button...Contents: Basic Computing Concepts; The Mechanics of Program Execution; Pipelined Execution; Superscalar Execution; The Intel Pentium and Pentium Pro; PowerPC Processors - 600 Series, 700 Series, and 7400; Intel's Pentium 4 vs. Motorola's G4E - Approaches and Design Philosophies; Intel's Pentium 4 vs. Motorola's G4E - The Back End; 64-Bit Computing and x86-64; The G5 - IBM's PowerPC 970; Understanding Caching and Performance; Intel's Pentium M, Core Duo, and Core 2 Duo; Bibliography and Suggested Reading; IndexNormally, books like this are endless pages of painfully detailed descriptions of technology that only a true engineering geek could understand and love. For the rest of us mere mortals, we have to make do with simplistic descriptions of the chip that runs our computers. All the details are taken on faith. Stokes successfully bridges the gap between textbook details and real-life analogies to make the work of the CPU understandable. He starts off with the basics of how a CPU works and how instructions are executed. From there, he introduces the concept of pipelined instructions, and shows how that creates a much faster chip. But there are drawbacks, and when you're done reading you readily understand those limitations.

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