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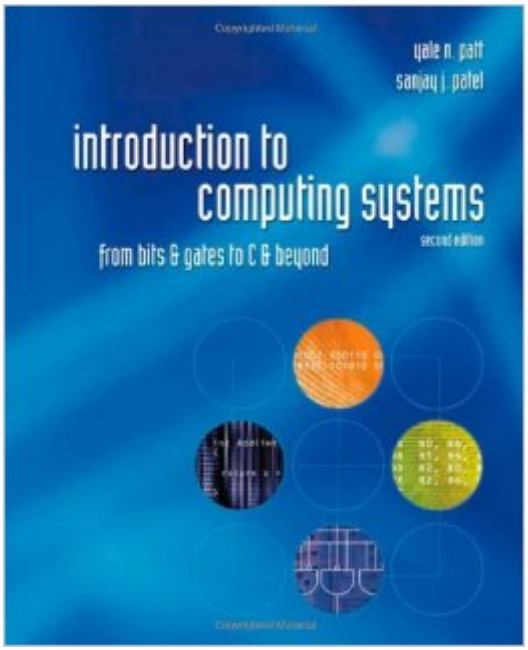
Introduction To Computing Systems: From Bits And Gates To C And Beyond



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Synopsis

Introduction to Computing Systems: From bits & gates to C & beyond, now in its second edition, is designed to give students a better understanding of computing early in their college careers in order to give them a stronger foundation for later courses. The book is in two parts: (a) the underlying structure of a computer, and (b) programming in a high level language and programming methodology. To understand the computer, the authors introduce the LC-3 and provide the LC-3 Simulator to give students hands-on access for testing what they learn. To develop their understanding of programming and programming methodology, they use the C programming language. The book takes a "motivated" bottom-up approach, where the students first get exposed to the big picture and then start at the bottom and build their knowledge bottom-up. Within each smaller unit, the same motivated bottom-up approach is followed. Every step of the way, students learn new things, building on what they already know. The authors feel that this approach encourages deeper understanding and downplays the need for memorizing. Students develop a greater breadth of understanding, since they see how the various parts of the computer fit together.

Book Information

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Customer Reviews

This book is really good for learning the basics of how a computer functions. It takes you from the low-level Flip-Flops to explaining how a register and other small components of a computer work. Then the book shows you the basic components a computer, and then gives a full example in the

LC-3. The LC-3 is complete with a architecture diagram and Assembly instructions. The book does a good job of of taking you through the LC-3 data path and showing how an instruction is implemented on the architecture. The book also does a good job of showing how the assembly code connects to higher level languages like C/++ or Java. It also gives a high-level explanation of exactly what a compiler does. Towards the end it gives some information on data structures and particularly as to how a stack would be implemented by the LC-3 in assembly. The book also explains how memory works and how input and output are handled in some computers.Some problems with the book are in the C section. This book does not give a real C tutorial, there are much better guides to C programming.It doesn't really give you any instruction as to how to program in LC-3 Assembly; however, the instructions are simple enough that you should be able to figure it out. Another potential problem is the combinational logic section. This part of the book is not really comprehensive, but teaches what you need to know so that you understand how all the low-level components work; however, if you want to design your own combinational logic, then there are other books for that. Also this book does not really go into the theory of how and why they developed the LC-3 architecture as it is. It is just an intro to get you used how a computer architecture looks and how it works.

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