Preface

One of the most interesting aspects of computer architecture is the rate at which the field changes. Innovation occurs on an almost-daily basis, offering opportunities for individuals to contribute to the field. However, this rate of progress is one of the greatest challenges to teaching computer architecture and organization. Unlike many other fields, courses in computer architecture and organization must change on a term-by-term basis to incorporate new developments in the field without overloading students with material. Writing textbooks for the field is similarly difficult, as the author must find a balance between cutting-edge material and historical perspective.

This book includes a selection of topics intended to make it useful to readers with a wide range of previous exposure to the field. Chapters 1 through 5 cover many of the basic concepts in computer organization, including how performance is measured, how computers represent numerical data and programs, different programming models for computers, and the basics of processor design. Chapters 6 and 7 cover pipelining and instruction-level parallelism—two technologies that are extremely important to the performance of modern processors. Chapters 8, 9, and 10 cover memory system design, including memory hierarchies, caches, and virtual memory. Chapter 11 describes I/O systems, while Chapter 12 provides an introduction to multiprocessor systems—computers that combine multiple processors to deliver improved performance.

It is my hope that readers will find this book useful in their study of the field. I have tried to make my explanations of each topic as clear as possible to avoid getting bogged down in detail. Compressing the field of computer architecture and organization into a book this size was a challenge, and I look forward to any comments that readers may have about the selection of material, the exercises, or anything else related to this work.

In conclusion, I would like to thank all those who have made this effort possible: my parents, my friends, my colleagues at the University of Illinois, and all of the teachers who contributed to my own education. In addition, I would like to thank the staff at McGraw-Hill for encouraging this work and for their tolerance of schedule delays.

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