Books

Introduction to Computer Architecture and Organization, second edition, H. Lorin, Wiley-Interscience, John Wiley & Sons, Inc., New York, 1989. 359 pp. (ISBN 0-481-61404-1).

If the reader wants an abstract introduction to computer architecture, this is the book. The early chapter introduces the idea that a computer system is a set of building blocks. This is useful in concept as present-day technology allows for the construction of computers using a technological mixture of hardware and software units, i.e., computer cards with microprocessor and memory chips having associated software in memory. Families of computers can be built using a split of function between the hardware and software to obtain different performance/cost characteristics.

The book is divided into three sections. Part one is a basic introduction to the concepts of computer architecture. Here the elements of architecture are related to the definitions of a system organization, including data width, memory, I/O organization, and functional implementation. The implementation choices are discussed in terms of examples that include the System/360™ family of computers and their extensions to System/370™, System/370XA (Extended Architecture), and Enterprise Systems Architecture/370™ (ESA/370™). The author then introduces the packaging concepts of personal computers. Part two presents details of different aspects of an architecture and discusses several different variations, describing the advantages and disadvantages of each.

The book is an excellent treatise on instruction sets and register and stack architectures. The memory section describes the different addressing schemes used for memories. The concepts are first introduced in a chapter on real addressing and include memory protection methodology. The memory chapter discusses the evolution of virtual addressing and memory relocation. The section describing subroutine linkages and branching is one of the best presentations on this subject I have seen in a single text.

The third part discusses most of the organizational techniques in computer system design. It starts with the simple instruction fetch-execution (I-E) cycle instruction descriptions and progresses through look-ahead techniques, memory interleaving, hierarchical memory subsystems, and high-speed overlapped input/output designs.

This book uses mainly the large systems of IBM and Cray as examples for the architectural descriptions. Some small-system examples, such as the DEC PDP-11 and microcomputer organizations, are also presented. Multiprocessor organizations are discussed with an emphasis on some of the memory design limitations. An interesting and simple discussion is made describing processor synchronization and necessary sequentionalization for shared buffers.

In all, I enjoyed reading this book as it covers a difficult area in a simple succinct presentation. I

highly recommend it for an introductory course relating to the broad aspects of computer architecture. This reviewer would have liked to have seen some discussion of what may be a "lost generation" of small machines—for example, the decimal aspect of the IBM 1620, the two-member family of the IBM 1130 and the IBM 1800, with some cousins as used for real-time systems. The business architectures using the IBM 1401 and System/3 linearity would have been some of the interesting additions to the book.

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Computer Graphics, Principles and Practice, second edition, James D. Foley, Andries van Dam, Steven K. Feiner, and John F. Hughes, Addison-Wesley Publishing Company, Inc., Reading, MA (1990). 1174 pp. (ISBN 0-201-12110-7).

Foley and van Dam—both of whom are in the forefront of their field—have provided a standard text in the field of graphics and visualization since its infancy. Now with Feiner and Hughes, the authors keep up the tradition. Their book covers all of the material in the first text, with a fair amount of appropriate reorganization due to the kind and availability of technology that has since evolved.

The authors cover a range of material starting at the raster-graphics level and continuing to user interfaces and hardware technology. Without going into implementation specifics, the authors explore the nature of windowing systems of various manufacturers and how people present user interfaces using these systems. This has allowed for the presentation of many techniques and ideas, without being locked into a particular windowing system or platform. As a result, the material will be important to anyone doing software development of any kind, and especially visualization, for years to come.

Since the last edition was published, a vast wealth of new graphics technology has been added to the field, including advances in image processing, solid modeling, ray tracing, and volume rendering, as well as hardware. The authors present details of a wide range of graphics user interface windowing systems currently on the market. Although the first edition was important to the field of computer graphics and visualization in its infancy, this book promises to be important to the user community at large, because graphics and visualization are developing a greater and greater importance in all facets of general computing.

While many available texts on graphics have outlived their usefulness after the technology on which they were based became obsolete, the first edition of Foley and van Dam has remained a standard in the field. The new edition promises to continue to provide a foundation and valuable resource for any researchers coming to the field during the next decade. The meticulous care of the authors is reflected to their credit in this book, which is a must for anyone entering computing or any scientist who uses computing nowadays.

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Note—The books reviewed are those the Editor thinks might be of interest to our readers. The reviews express the opinions of the reviewers.