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# Book reviews

*Digital Computer System Principles*, by H. Hellerman, 1973; 466 pages. (*McGraw-Hill*, £7·60)

Presumably the title of this book is intended to be parsed either as *Digital Computers, System Principles* or as *Digital Computers, Systems Principles*. Unfortunately its contents do not live up to either title, in this, its second, edition. When Professor Hellerman originally prepared this book in the mid-sixties, it covered adequately the principles of Computing Systems as they were then known. Moreover, his use of APL for the formal description of the mechanisms and algorithms considered represented a pioneering effort as real as, for example, Hellerman's work in creating the first machine implementation of Iverson's notation as it was then. Unfortunately from the point of view of this book, much has changed in the last five years. It is a pity that the publishers chose to issue a new edition at a time when, in this reviewer's eyes, the book is principally of historic interest.

A computer today derives its character and its user visible structure from its software in general and the operating systems in particular. Yet in this 460 page book there are, according to the index, only two very brief references to operating systems, on pages 119 and 374 respectively, though this reviewer noticed additional unindexed references in the early pages of the book. Any graduate or undergraduate course teaching Computing Systems Principles or Computer Science must approach the subject in terms of the total system and the user visible characteristics that it displays. This the book completely fails to do, despite the claim in the blurb that 'this extremely revised text seeks to give the student or professional an introductory yet deep understanding of the architecture and design of programming and equipment structures in modern computer systems'.

In fact the only real solid reference to programming languages and software is the second chapter which consists primarily of an introduction to APL and the power of that language in many different situations plus a brief section on compilers. It has been claimed that the present reviewer should count himself amongst the APL addicts. Be that as it may, he may objectively welcome Hellerman's use of APL as an educational medium. But this does not make up for the total inadequacy of this book at this time as an educational tool, as an introduction to computer systems or as a summary of the principles that may be associated with their design, implementation and use. Whatever its value in the past, today this book can at best be seen as recommended reading for a student of 'classical machine architectures'. It certainly does not present Principles, or Systems or otherwise.

M. M. LEHMAN (London)

*Digital Systems: Hardware Organization and Design*, by Fredrick J. Hill and Gerald R. Peterson, 1973; 481 pages. (*John Wiley and Sons Ltd.*, £9·00.)

The book is based on the premise that the natural way to describe the organisation of a digital computer is to use a high level programming language and the authors explain their reasons for using APL. The ability to design digital systems and implement them speedily with confidence depends very much on this sort of capability, and the authors are to be congratulated on the timeliness and quality of their presentation. It conveys their obvious enthusiasm for the subject and the liberal use of worked examples, and additional problems in each chapter encourages the reader to participate in the design process.

The material essential for their purpose is contained in Chapters 4 to 8 inclusively. The first three of these establish design conventions, introduce the hardware programming language and illustrate the organisation of a machine by reference to the five categories of order which it obeys, e.g. input/output, normal operate instructions, read operand, store operand, and branch. The control of the data paths and registers, that is the timing of the machine, is dealt with at length in the remaining two chapters. Chapter 7 deals with the basic techniques of timing and refers to 'hardwired' techniques whereas chapter 8 is devoted entirely to the concepts, and implementation of the slower but more flexible technique of micro-programming.

A general introduction in Chapter 1 which also outlines the objectives of the book leads to a description of the organisation and programming of a small instructional computer in Chapter 2. Some of the concepts introduced in this way, in particular those of logic and storage, are given physical form in Chapter 3 which discusses system components. Additional information of a relevant nature is provided in Chapters 9 to 13 which discuss basic communication between sub systems, input/output techniques and the arithmetic operations of addition, multiplication and division on an integer and floating point basis.

The book concludes with brief descriptions of important features from large fast machines in Chapter 14 and special purpose systems in Chapter 15. These range from a variety of storage techniques such as interleaved memory banks, scratchpad systems, virtual memory, push down memory, through small purpose processors for display purposes and digital filtering, to large special purpose machines such as Star and Illiac IV. Whilst I could wish that more comment on these last items had been made, it is also clear that space could not permit this and these topics clearly provide scope for future publication.

This book is written in a direct and purposeful manner with careful selection of the material content. I am pleased to recommend it to all those who have a serious interest in understanding computer organisation and design, ranging from the undergraduate student to the professional engineer. The only drawback is its price.

D. B. G. EDWARDS (Manchester)

*Modern Data Processing for Management: a basic systems approach*, by B. A. Hodson, 1973; 318 pages. (*Macmillan of Canada*, Can. $16.50.)

The last three years have seen a flood of books on business data processing. Most of them have been aimed at the college or university student and only a few at the general reader or business executive. Some authors, Mr. Hodson included, have claimed that their book is equally suitable for both types of reader.

This author claims that his book is neither too technical to be understood by managers nor too general to be valuable for computer professionals. Most professional computer staff will, I believe, disagree with this viewpoint. There are, however, several good things to be said of the book. It is well presented and readily understood. Unfortunately, though, most of the examples of hardware systems are out of date and most of the economic data is irrelevant for the same reason. The author's ideas on the methodology of systems analysis and design have, however, stood the test of time. Many of his forecasts about the future of computing systems have either been realised or are well on their way to that state.

It is difficult to be enthusiastic about this book. It is unlikely to sell in large numbers in this country as many better books are available.

J. O. JENKINS (London)