does not wish to make the mistake of trying to divide the world of computing into water-tight compartments. Martin's books cover overlapping areas and are designed to make the reader aware of the close relationship that exists between these neighbouring technologies.

This latest book covers the Data Base world and concentrates on the need for careful planning either when introducing data base techniques or simply contemplating changes to existing systems. It is impossible to quarrel very seriously with anything Martin writes. He is always careful to avoid controversy and instead concentrates on such universally acceptable proposals such as 'Implementing the whole of an information architecture will take years. It is necessary to decide what to do first . . .'. One is tempted to add that a similar discipline is required by the potential reader of Martin's library of Computing books.

It is very difficult to know what market this book will serve. Like all successful authors, Martin has a following and no doubt libraries will wish to keep their collections up to date. Busy data processing managers may not find it very inviting and the paucity of supporting evidence for Martin's assertions will not endear the book to academic circles. It will be interesting to see what 1983 offers the James Martin fan.

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M. JAMBU AND M-O. LEBEAUX
Cluster Analysis and Data Analysis
North-Holland, Amsterdam, 1983. 888 pp. Dfl. 200.00.

This is a formidable tome which is divided into two parts. Part 1, 'Methods and algorithms', occupies 254 pages and Part 2, 'Computer programs and user's guide', fills the remainder. At the end of each part there is a list of references, over 300 in the case of Part 1 and just 20 for Part 2.

The authors use Cluster Analysis to mean 'the set of computer procedures which build up or recognise hierarchies or partitions underlying data sets'. By Data Analysis they mean those procedures which 'describe, recognise or identify structures underlying clouds of points' e.g. multidimensional scaling, factor analysis and related techniques.

The treatment is mathematical throughout and some original material is included in Part 1. The programs presented in Part 2 are written in FORTRAN; there are 40 programs and 326 subroutines representing a total of 25 000 statements.

The text includes some examples of how the programs are used but they would not be of much help to the newcomer to the subject. In many ways this is a reference book and it is not intended that it should be read from start to finish. Rather the researcher would select the sections of interest. Unfortunately there is no index and thus the table of contents must be relied upon. Although this is quite detailed it does not really serve as an adequate index and so it is difficult to find the sections of interest.

This book is, as one would expect, very up-to-date and since it is so comprehensive it can be recommended as a reference volume. However, as a guide to *users* of Cluster Analysis this reviewer believes that it is quite incomprehensible and in this context it does not replace Sokal and Sneath's *Principles of numerical taxonomy* which remains the most readable authoritative work. The translation from the original French is excellent and full credit for this must go to Ms H. Teil.

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NORMA KLISS LEHMKUHL
Fortran 77 A Top-Down Approach
Macmillan, New York, 1983. 466 pp.

This is an introductory text intended for students and assumes no background other than elementary algebra: it explicitly does not aim to be a reference book on Fortran. The order in which language concepts are introduced indicates the orientation of the book: first list-directed output of character constants, then assignment for real and integer variables, further list-directed input and output, control structures and formatted input–output. These are followed by variable types other than real and integer and by one- and two-dimensional arrays. The book is almost finished before subprograms and common blocks appear. A final chapter summarizes auxiliary input–output statements including OPEN and CLOSE, and an appendix covers some of the remaining statements such as ENTRY, EQUIVALENCE, and SAVE. Some commonly used statements like BLOCK DATA, IMPLICIT, INQUIRE and unformatted input–output are not described; nor are most of the new possibilities for character manipulation available in Fortran 77 compared with Fortran 66.

There is strong emphasis throughout the book on first defining an algorithm to solve the given problem, on drawing a flowchart to represent the algorithm and on coding from the flowchart. There are numerous exercises at the end of each chapter. The language described is Fortran 77; some, but not all, deviations from the ISO standard are noted, the most noticeable unremarked divergence being the description of the OPEN statement.

The text takes the student through the language very slowly, very thoroughly and very competently up to 30 pages from the end of the last chapter. It comes as a surprise that there is a confused description of common blocks and an incorrect interpretation of adjustable arrays. Nevertheless the book would make a suitable text for a student wanting to learn the language for general interest or for use as an occasional tool. Other introductory texts would be more appropriate for anyone proposing to earn their living wholly or partly by writing Fortran.

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J. D. FOLEY AND A. VAN DAM
Fundaments of Interactive Computer Graphics
Addison-Wesley, London, 1982. 664 pp. £15.95.

The two authors of this book have been major contributors to the area of computer graphics over the last decade. This book captures a great deal of their knowledge and is a major addition to the computer graphics literature. The emphasis is on interactive systems. The book is divided into four main sections with the first section giving a complete introduction to the subject (both hardware and software) using an interactive office layout system as the application to be defined and a simple graphics package in which to describe it. Particular attention is paid to the concepts needed for good interactive design. The algorithms required to code the graphics package (coordinate transformations, clipping, segment storage, etc.) are given in detail. All the examples are coded in PASCAL and given in full.

The second section concentrates on the mathematics of viewing in three dimensions including perspective. It introduces the models required to hold the application data and how they relate to the graphical data structures. The third section describes display files and other hardware assists given by modern display technology. Particular attention is paid to raster displays with algorithms for line drawing, anti-aliasing, area filling and polygon clipping.

The final section is the most original, concentrating on the production of realistic synthetic images. Hidden surface removal, shading, texturing, lighting and colouring are all described. Most of the new work in this area is either described or referenced.

The authors are to be congratulated on a major achievement. Beautifully produced with exciting illustrations, it is recommended to anybody with an interest in computer graphics.

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