language was briefly described and shown to be capable of handling data transferral in the four extreme distributed data base environments. A generalised data structure for supporting the mapping function is illustrated. The presented method accommodates a variety of user views of data base structure, is independent of whether the data base is geographically distributed or centralised, furnishes a straightforward security mechanism and provides a basis for coping with the contingency of uninformed users who may even be unaware of the logical distribution.

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Book review

Advanced ANS COBOL with Structured Programming, by G. D. Brown, 1977; 497 pages. (*John Wiley*, £13·50)

High Level COBOL Programming, by G. M. Weinberg, S. E. Wright, R. Kauffman and M. A. Goetz, 1977; 252 pages. (*Prentice-Hall for Winthrop*, £13·55)

Both these books have the aim of allowing people to produce programs which are easily readable and maintainable and which are correctly structured. It is not therefore surprising to find chapters on structuring, style and testing in each. However their approach differs greatly.

High Level COBOL Programming takes a philosophical outlook to the problem. It considers the basic requirements of any program; the businesslike approach necessary to programming; and the need for good management in a programming environment. From this start it considers how programming should be controlled and how good quality programs can be written, pointing out that only too often standards are written purely as a result of a programming disaster of some type and not through any professional process. Much of the rest of the book is devoted to the ways in which various tools can aid the programmer. The authors argue that preprocessors allow programmers to use shorthand, while still producing fully readable outputs. By the use of macros, they can provide facilities to overcome some of the trickier COBOL areas, such as DO-WHILE constructs and the necessity for GO TO statements. The preprocessor described in the book is MetaCOBOL. This has an extension which can be used to aid the testing and control of the programming.

A further tool described is the source program management system LIBRARIAN which can be used to update libraries; maintain security, providing reliable back-up; and to provide a complete audit trail of changes made. Its ability to do simple SYNTAX checking and various levels of control listings is also pointed out.

In its arguments on methods of style to be used, techniques to be evolved and methods of testing a program, the use of these tools is presumed. The authors declare their interest in the software tools in that several of them are from the software house which develop them. It is a pity that names of similar products were not at least mentioned.

Advanced ANS COBOL with Structured Programming concentrates on the advantageous use of some of the more complex areas of COBOL. The ANS compiler used the latest IBM 370 version, and any differences from the '74 standard are noted. The book is well written, with excellent examples of many areas. The information on the SEARCH verb; the COBOL report writer; and the sort feature will be of particular assistance to readers and are considerably clearer than in any manufacturers' manual or similar reference book.

The book could be treated simply as a reference book, but any COBOL programmer would be likely to gain considerable knowledge from a thorough study of it. There are some criticisms of the book. Although structured programming is covered, it is not really dealt with in sufficient depth to justify the title. A chapter on the types of diagnostics which arise, even if only on IBM compilers, might have been of more general interest than one on IBM JCL and machine/language interface in general.

To summarise, two well written, easily readable books. Anyone possessing the software tools mentioned in *High Level COBOL Programming* would probably find it invaluable; anyone considering these or similar tools would find it interesting and others would probably enjoy reading it even if the cost might be hard to justify. The second book, *Advanced ANS COBOL*, wold not be out of place in anybody's computer library. Any IBM installation might seriously consider what part this book could play in a training programme.

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