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B77-8 Course Notes on Software Development Tools and Techniques for Microcomputers—D. C. Collins, E. R. Garen, A. E. Koehler, and L. L. Lazar (Culver City, Calif.: Integrated Computer Systems, Inc., 1976, 320 pp., $99.50).

These notes were developed for an ICS two-day short course, intended to provide a comprehensive introduction to all aspects of microcomputer software development, step-by-step procedures for the development of efficient software, and descriptions of specific techniques for implementing logic and data processing functions.

The notes are 8½” × 11” printed versions of overhead projection transparencies in an attractive three-ring binder. Also provided in softbound form are a 550-page compilation of relevant manufacturers’ specification sheets and product descriptions, and a 250-page compilation of papers reprinted from various journals.

There are nine sections in the notes: introduction; software fundamentals; microcomputer programming techniques; system analysis; program design; program implementation using development software; hardware/software integration, testing, and debugging; software/system documentation; and future trends in systems and system development. The material starts with elementary definitions of concepts and terminology, and moves rapidly to meaningful applications and sample programs. Illustrative exercises include a program to implement an electronic lock, a program to generate a 100 msec pulse every 600 msec, and an analysis of the tradeoffs encountered in hardware versus software solutions for debouncing a switch. Although mostly independent from specific device or vendor, the notes do cite the Intel 8080 as the illustrative processor and the Intellec microcomputer development system (MDS) assembler, text editor, and monitor for software concepts.

It should be emphasized that these are notes—in most part visual aids used in teaching an intensive shortcourse. Hence, the material is sketchy and lacks narrative, but on the positive side it is concise. For someone who wants to quickly update himself on microcomputers, these notes are ideal “crib” sheets for a cram course.

Frank P. Mathur  
Book Reviews Editor

B77-9 Algorithms + Data Structures = Programs—Niklaus Wirth (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 366 pp., $14.95)

This offering by the prolific Professor Wirth has a heft and depth that may put it on a par with Knuth’s books. Indeed, one might be tempted to draw a parallel between these two authors’ styles if it weren’t for the fact that Wirth’s orientation is fundamentally different than what Knuth has used in the past. Naturally, the book is expressed in PASCAL, and an appendix gives the usual PASCAL syntax diagrams.

Algorithms + Data Structures = Programs is organized into five chapters (discussed individually below) and seems to be intended for use in a second course in programming or, possibly, as one part of an advanced course in modern software theory and practice. Wirth’s approach is novel in that it emphasizes many of the more modern techniques (stepwise refinement, concentration on data structures, machine independence, and transportability) than do conventional texts that deal with programming.

The book opens with an excellent treatment of the basics of data structures, set at a level that requires some foreknowledge of “what’s going on with a machine,” and without requiring any deep mathematics for good comprehension. In the text, the notion of a data structure is expanded as far as a hierarchical record structure, closely matching what’s automatically available in PASCAL. This is all in Chapter 1; by the end (in the problems), the reader is asked to write a reasonably sophisticated text editor.

Chapter 2, on sorting, begins the concentration on algorithms. All of the cleanest (and best) sorting algorithms are treated. There is, in addition, a short comparison of sorting methods which serves to keep the reader from feeling he knows all there is about the subject!

Chapter 3 is excellent: its subject is recursion, and right at the beginning it asks the reader’s caution by dealing with “When Not to Use Recursion.” But the temptation to play with Hilbert curves (page 132 ff) is too great. That leads (naturally) into Gauss’ Eight Queens Problem, along with two other recursively solvable ones. Moreover, the solutions given seem transparent enough.

Having introduced the elements of recursion, Wirth then gets into recursive data definitions. Chapter 4, on dynamic information structures, extends the treatment of data structures by discussing linear lists, tree
Chapter II addresses the concept of program correctness. Emphasis is placed on conditional looping and the notion of a loop invariant is introduced and illustrated. This discussion provides insight into the purpose of initializing code and yields guidelines for programming iterations correctly.

Chapter III presents in detail the concepts of structured coding and its relationship to reliability. Sufficiency of the three basic structures (SEQUENCE, IF-THEN-ELSE, and DO-WHILE) for expressing all program logic is demonstrated. Additional permitted structures (ITERATIVE-DO, SELECT-CASE, REPEAT-UNTIL, and LOOP-EXITIF-ENDDO) are also described through examples.

Chapter IV examines program design, coding, and integration from the top-down perspective. This approach demonstrates that a program can be divided into a number of small structured programs utilizing subroutines and macros. A comparison between the top-down segmented strategy and the conventional bottom-up strategy is illustrated. The facilitation of program testing from a top-down viewpoint is depicted.

Chapter V explores IBM's chief programmer team (CPT) concept, which appears to be a successful managerial approach to the organization and the operation of software projects. The efficient use of highly skilled personnel in actual design and programming is brought about by the separation of programming from clerical activities in CPT implementation. The CPT approach embraces the concepts of the top-down structured programming methodology.

Chapter VI presents (in pseudocode) a top-down structured design for a hypothetical multiprogrammed, multiprocessor operating system. The concept of a "resource semaphore" to coordinate queuing and allocation for resource sharing by concurrently executing processes is introduced. The design is developed to the point where it can be directly coded in PL/I.

Top-down Structured Programming Techniques presents a lucid and well written perspective of techniques that are being widely accepted to improve software quality. Many good examples illustrate the concepts presented. The book is designed for experienced programmers with a detailed knowledge of PL/I. This is not a textbook, but would certainly be suitable as a major resource for a senior level or graduate course in software engineering.

W. M. Lively
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unnecessary confusion by relying too heavily on colloquialisms and certain words reserved for special meanings within the programming language. With some serious thought, the desired simplicity could have been maintained without these poorly chosen words.

Another difficulty with this book is its physical layout. Before a second printing, attention should be devoted to appropriate positioning of text and diagrams. The flowcharts themselves, although programmatically correct, are hard to follow because labels are used to bridge discontinuities.

Although claiming to be designed for a student with "a slight knowledge of algebra and trigonometry," the book presents some examples based on matrices, integration, and iterative methods that are beyond the level of elementary math and that require a scientific background.

However, the book's biggest flaw is that it teaches strictly by example. Although solved problems do tend to exemplify a concept or procedure, examples by themselves do not make a good learning text. Definitions are needed, if for no other reason than to present the syntax of Basic as well as to give the student a firm basis on which to build. Although one would not wish to use BNF in an elementary textbook, the instructions in Basic could be "defined" in short, logical sentences. These definitions would provide reference so that a student would not have to re-read an entire chapter in order to review its contents. This approach is carried out with some success in BASIC by Marateck (New York: Academic Press, Inc., 1975). In short, learning by repeated example is valid only in those situations where a definition cannot be given. With respect to the Basic language, definitions could have and should have been given.

Although the book does present Basic (by example), it does not present the concept of programming. It does not instruct on the topic of converting a word or thought problems into an algorithm or program. This is an area that most introductory Basic books ignore and hence force the student to learn either by trial and error or from a supplemental text. This is unfortunate because the neophyte programmer needs as much instruction in designing an algorithm as writing in a programming language.

Finally, the book is a rehash of material already presented in numerous texts and offers nothing new or different. There are better books covering this topic. Ronald L. Herold
State University of New York Stony Brook

Just Out . . .
The Proceedings of the AFIPS/FCC Planning Conference, November 8-9, 1976—100 pp.
Proceedings from conference provides technological information relevant to the initiation by the FCC of a second "computer inquiry" which will consider regulatory policy related to computer communications and the uses of computers in communications. Volume includes a review of state of the art computer communications, current research topics, and contemporary user demands plus commercial responses to such demands. Non-members—$10.00 Members—$7.50

Proceedings of the 1976 International Conference on Parallel Processing, August 24-27, 1976—328 pp.
Proceedings cover every facet of parallel processing with contributions from more than 80 authors representing countries around the world. General session topics include image processing, operating systems, system architecture and organization, scheduling, system performance, reliability, applications, staran and related topics. performance, multiple-microprocessors, fundamental theory, and language issues. Non-members—$20.00 Members—$15.00

Symposium on Modeling and Analysis of Data Networks, March 18, 1976—92 pp.
Prime emphasis is on the principal problems arising in data network design requiring modeling and capable of being handled by quantitative methods. Workshop reports include presentation of protocols and networking interfacing, analytical and algorithmic techniques, network performance issues, satellite and radio networks, adaptive routing and flow control, network design and optimization, queueing models, and packet vs. circuit switching and alternatives. Price—$5.00

1976 Publications
Trends and Applications 1976: Computer Networks, November 17, 1976—186pp.
Proceedings topics include experiences in network design and implementation; protocols; flow control/routing; services and user considerations; hosts vs. the communication subnetworks; and modeling, analysis, and design. Held in Gaithersburg, Maryland, this one-day symposium is sponsored by the IEEE Computer Society’s Technical Committee on Computer Communications and the National Bureau of Standards. Non-members—$12.00 Members—$9.00

Proceedings of the 1976 Symposium on Computer-Aided Diagnosis of Medical Images, November 11, 1976—100 pp.
This one-day symposium, held in conjunction with the Third International Joint Conference on Pattern Recognition, featured 16 papers on such topics as medical imaging from both the engineer’s and the physician’s viewpoint, recognition of vessel shadows, quantitative diagnosis of early pulmonary edema, picture processing of echocardiographic data, dynamic boundary surface detection, interactive graphics for lung volume determination, image processing for computer tomography, and studies on the utility of brain scanning. Non-members—$12.00 Members—$9.00

Proceedings of the 3rd International Joint Conference on Pattern Recognition, November 8-11, 1976—680 pp.
Contains over 150 papers on industrial applications, feature extractions and primitive selection, syntactic methods in pattern analysis, optical character recognition, learning algorithms and sample sizes, line drawing and waveform processing, interactive pattern analysis, statistical pattern recognition theory, perceptual modeling, clustering, linguistic applications and natural language processing, segmentation and shape encoding, medical image processing and pattern analysis, picture description and scene analysis, speech recognition, remote sensing, parallel processing and two-dimensional digital filtering, edge and object recognition, pattern recognition applications, image analysis and texture, and data base computer systems. Non-members—$25.00 Members—$18.75

Proceedings of the 17th Annual Symposium on Foundations of Computer Science (formerly called the Annual Symposium on Switching and Automata Theory), October 25-27, 1976—276 pp.
Program topics include analysis of algorithms, computational complexity, formal languages, mathematical theory of computation, switching and automata theory, and theory of programming, compiling, and formal semantics. Non-members—$20.00 Members—$15.00
Digest of Papers from the 1976 Semiconductor Test Symposium, October 19-21, 1976—105 pp.

Symposium covers LSI testing before, during, and after production from the standpoint of the vendor, user, and test equipment manufacturer. Digest topic headings include "Memory," "Microprocessors," "Reliability," "Design for Testability," "Test Facilities and Techniques," and "Test Languages."

Non-members—$8.00 Members—$6.00

Proceedings of the Fifth Texas Conference on Computing Systems, October 18-19, 1976—171 pp.

Proceedings covers basic problem areas and provides a forum for both the industrial and academic communities to discuss areas of computer applications. Topic areas include programming language, data base systems, data base models, distributed systems, program design, data base usage and performance, data base languages, and operating systems. Non-members—$20.00 Members—$15.00

Proceedings of the Second International Conference on Software Engineering, October 13-15, 1976—700 pp.

Topics covered in this proceedings include software requirements and specifications, program synthesis techniques, operating systems, education, performance evaluation, networks, design and development, programming languages, modeling, testing, tools, and case studies. Non-members—$20.00 Members—$15.00

Tutorial on Software Design Techniques, October 12, 1976—277 pp.

Text is intended for the beginning and the experienced designer. Contains 18 key papers on software design, over 100 pages of original material on important design concepts and examples, and an annotated bibliography. Book is as helpful for those who did not attend the tutorial as for those who did. The volume presents a variety of techniques, rather than a single coherent methodology, with the objective of presenting new ideas and alternatives in design. Non-members—$12.00 Members—$9.00

Ninth Annual Workshop on Microprogramming, September 27-29, 1976—61 pp.

MICRO 9 proceedings covers bit slice architecture, certification by an algebraic method, implementation of a scheduler, PDP-11 emulation, design problems in emulating the MIX computer on the Microdata 1600, designing machine independent microprogramming languages, realization of a virtual machine, an approach to software/firmware high level language support, automated proofs of microprogram correctness, and a machine architecture for efficient matrix multiplication. Non-members—$35.00 Members—$28.00

Digest of Papers from COMPCON 76 Fall: "Computers by the Millions," September 7-10, 1976—350 pp.

Digest, from the IEEE Computer Society’s own international conference, includes topics dealing with components, hardware and software, system design, and application, presented by many of the leading computer scientists and specialists in the world today. Non-members—$20.00 Members—$15.00

Digest of Papers from the 1976 International Symposium on Technology for Selective Dissemination of Information, September 8-10, 1976—101 pp.

Proceedings from this symposium, held in the Republic of San Marino, includes papers on data base systems, information systems, data networks, transmission technology, data management, user-oriented systems, interactive graphics, and applications in education and humanities. Non-members—$16.00 Members—$12.00

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Digest of Papers from the 1976 International Optical Computing Conference, August 31-September 2, 1976—150 pp.

The digest serves as an update on the technical growth and broadening application of optical computing, and as a medium for presentation of new thinking and creative approaches to information processing. Included in the digest are 35 papers dealing with the wide scope of topics that optical computing encompasses. Non-members—$16.00 Members—$12.00

Proceedings of the Third International Conference on Computer Communication, August 3-6, 1976—655 pp.

Proceedings could be considered the single most valuable document reflecting the global state of the art in computer communication. Text covers the activities in progress in computer communications throughout the world, including presentations from authors representing more than a dozen different countries. Non-members—$35.00 Members—$28.00

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