

Scientific PASCAL

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Ion Leon Batachia received the Diploma Degree in Computer Science from the Polytechnical Institute of Bucharest in 1987. In the years 1987 and 1988 he worked as engineer at the IMSAT Computing Centre in Bucharest. January 1989 he joined the Research Institute for Informatics. At present he is a senior researcher and is working towards obtaining a doctoral degree in applied informatics. His main current scientific interest is in decision support systems, embedded AI systems, and also object oriented analysis, design and programming.

The main objective of the book as the author himself mentioned is: "to teach programming in Pascal to people in hard sciences and technology, who do not have much patience with standard textbooks with their lengthy, pedantic approach, and their many examples of no interest to scientists and engineers".

The book emphasis is placed on scientific problems, and choosing Pascal as a working language is due to its easy to learn as first programming language and its clarity in coding. What is more, Pascal, invented by Nikolaus Wirth in the early 70s, is widely used and is rapidly getting on being the first language spoken of in introductory computer science/systems courses because it is more attractive than other languages, say BASIC or FORTRAN, being more clearer, supplying a better discipline for structured programming, broad flexibility for data types and because of its recursive nature.

Being addressed to readers with different backgrounds in science and technology and not necessarily to those having skills in programming or to specialists in computer science in general, the book is a self-contained text on the Pascal programming language. The dialect of the Pascal Language used is Borland Pascal (7.0).

The **first five chapters** of the book and also two appendices are dedicated to gradually introducing the readers to the world of programming under Pascal and also to different areas of application (important applications are presented starting with Chapter 4). Every aspect of Pascal programming basics and specific of Borland Pascal dialect (including installation of the Borland Pascal package, debugging, graphics, DOS, BIOS, and mouse programming)

is dealt with and applied through elaborate examples and exercises.

Data structures, programming techniques and algorithms that can be integrated into large programs as efficient pieces of code, are presented in the book in a form which is easy to understand.

Chapters 3, 4 and 5 which give examples of programs are concerned with sparse polynomials, real polynomials, mouse programming, fractals, graphing 3-space, ellipses and ellipsoids.

Chapter 6 concentrates on the recursion of "the heart and soul" of Pascal. The recursive algorithms presented deal with major themes like backtracking, recursive graphical algorithms, permutations and combinations.

Chapters to come extend the areas of application. Thus in the first two sections of **Chapter 7** the author explores recursive generations of curves from entirely different viewpoints than those of Section 4 (titled **Recursive Graphical Algorithms**) of the previous chapter: string generation of curves and probabilistic generation of figures with iterated function schemes. The next two sections deal with standard and non-standard problems of searching and sorting, while Section 5 is reserved to genetic algorithms used in optimisation based on ideas inspired from evolution. Interesting algorithms are also presented in the last Section of this chapter, titled **Miscellaneous Algorithms**.

Chapter 8 is dedicated to applications from discrete mathematics, with main topics concerning number theory, prime sieves, multiprecision arithmetic, polynomials, integer matrices and linear algebra. The last Section of the chapter gets the reader accustomed with some aspects of the OOP (object-oriented programming) which represent much more than a simple new style of programming. Programmers in Pascal must be prepared to cope with and be encouraged to use dialects of object-oriented Pascal which already appeared on the market. The benefits expected will be at least equal to the efforts invested in learning and practicing OOP.

Chapter 9, the last chapter of the book, completes the area of applications in the book with topics from mathematical analysis: approximation, sequences and sums, functions, zeroes of functions, integrals, differential equations.

The book is well- structured and the manifold objective of the author is well served: after finishing the book, the reader without a background in computer science, whose primary use of computer is for scientific applications, will have the feeling of coping with PC hardware and of mastering a powerful

programming language, while assimilating an important package of applications. For a specialist in computer science the programs and algorithms presented in the book could be very interesting. Even more, the book, which contains examples collected from numerical analysis and algorithm literature, includes a diskette with all of the program code printed in the text, answers to exercises, additional programs and useful data files. All the book's programs have been tested and they are listed in a clear format.

Leon Batachia