Visual Basic and Visual Basic .NET for Scientists and Engineers

CHRISTOPHER FRENZ
For my beautiful Love, Thao!
You're my inspiration for this book. Thank you for being such a supportive, caring, loving fiancée, and now wife, through this project and my life.
Anh yêu em!!!
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Preface

If you are a novice programmer, this book is designed for you. The text begins with an overview of the Visual Basic development environment, its important characteristics, and how the environment can be manipulated to suit your needs. Next, a discussion of forms and their uses ensues. This discussion is followed by coverage of the Visual Basic controls, which are most essential to scientific programming. You then learn how to put controls to work by making use of the different control events.

Once this introductory material has been covered, I show you the different data types that Visual Basic supports, with extra attention being paid to the various numerical data types and their uses. At this point the true heart and soul of the book begins, as you begin to gain insights into the various operators that can be used to manipulate these data types. You get an in-depth look at numerical and logical operators, and their order of operations are clearly spelled out.

Next, I describe the different types of loop structures and provide an explanation of the possible uses of each. Practical examples, such as mathematical iteration, are also given to clearly demonstrate the significance of loop structures in scientific programming. Following this, you learn about the different built-in functions that are available in Visual Basic and how to use them in your own projects. Many of these built-in functions are highly useful in the programming of mathematical routines, and thus are essential tools for any scientific programmer. Despite the extensive list of built-in functions, however, not every function you’ll desire to carry out is already worked out for you. Therefore, you also get a chance to explore the different ways in which you can code your own customized functions.

After a firm understanding of the crucial elements of the Visual Basic language has been established, I discuss methods for putting these principles together into a complete and polished program. The basics of file handling and data acquisition are explored along with sophisticated interface techniques that are useful in science, such as programming customized spreadsheets. The usefulness of these interface techniques are then exemplified by an example program that performs calculations on a mathematical matrix. The book then delves into coverage of topics such as scientific graphics and data presentation as well as the all-important topics of debugging and error handling. You discover ways to package and distribute your applications so that the rest of the scientific community can make use of your ingenuity.

By this point, you should have a firm understanding of how to code a scientific program, but this still leaves the question of what to code. Thus, the book next pursues the topic of mathematical modeling. I cover the basic principles of
mathematical modeling in depth and use them to illustrate how to mathematically model a chemical plant so that you have a clear idea of how to translate different aspects of your work into Visual Basic code.

The book then presents a brief introduction to the new but rapidly growing field of bioinformatics. Bioinformatics is a powerful new concept in biology that takes advantage of the processing power of computers to help researchers make sense of the ever-growing wealth of molecular biological information. I discuss the major endeavors being made in the field and demonstrate a procedure that could be used to find DNA sequence similarities in order to give you a true appreciation of the vital role that computers play. Finally, the book examines the relevant aspects of the new .NET platform and shows you how to code a scientific Web-based application.