Advanced Visual Basic

VB

Kip Irvine

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Kip R. Irvine
Miami-Dade Community College-Kendall

Scott/Jones Inc., Publishers
P.O. Box 696, El Granada, CA 94018
scotjones2@aol.com
(415) 726-2436 or Fax: (415) 726-4693
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This book is dedicated to
the many excellent students
at Miami-Dade Community College
who have helped me learn to teach
Visual Basic

Preface

At any time, I enjoy bringing out a new programming book. But it's especially pleasant to write about Microsoft Visual Basic®. Visual Basic 3 and Visual Basic 4 made a huge impact on the programming world and set the standard for visual interface programming. Now, with the transition to Visual Basic 5, programmers are more excited than ever to be creating ActiveX controls and programming on the Internet. Microsoft-certified Visual Basic consultants can almost name their own price if they have experience with the latest tools and techniques.

Why This Book Was Written

During the last few years, colleges everywhere have found Visual Basic to be a popular and useful vehicle for teaching Windows Programming applications and concepts. At Miami-Dade, we began teaching the course in late 1995. Soon afterward, we realized that Visual Basic should be taught at the intermediate and advanced levels, to people who take programming *very* seriously. We immediately found professional programmers and would-be programmers filling the second-semester Visual Basic classes. For two years I have been creating and refining stacks of course handouts and sample programs for this course, and getting great help from students. To say that students have *taught me to program* in Visual Basic is an understatement, because so many of them have shared their considerable knowledge and skills.

Features of This Book

Every experienced instructor knows that students have a variety of learning styles. Some learn from manuals; others from sample programs; some prefer the "human" touch, being able to spend one-on-one time with an instructor; some learn from step-by-step exercises. To help address different learning styles, this book contains a number of pedagogical features that serve to reinforce each other during the learning process:

- ***Object-oriented programming.*** During the survey and reviewing process for this book, we found that many instructors wanted object-oriented programming to be emphasized much more strongly than in existing Visual Basic textbooks. I completely agree! Therefore, objects are used throughout the book, with special emphasis on class design in Chapter 4, integration with databases in Chapter 6, OLE objects in Chapter 9, and designing ActiveX components in Chapter 11.
- ***Discussions about program design, coding style, object-oriented concepts***. These concepts are at the core of a solid computer science education.
- A ***short table of contents*** is displayed at the beginning of each chapter. People like to see what the chapter is about, at a glance.

- ***Pop-up programming tips*** that show up in gray-shaded boxes. The reader can ignore these without disturbing the flow of the main text body, and come back to them later. It's surprising how often these little tips become useful when programs won't work!
- ***Reference information*** on Visual Basic, the Jet Database Engine, Crystal Reports, the Windows API, ActiveX components, and online help. The Microsoft manuals and online help are wonderful, but it's not easy to limit the scope of information. In this book, you find lots of tables and lists, just when you need to use them in a program.
- ***Hands-on programming examples*** that guide the reader while working at the computer. These are short and simple, designed to demonstrate concepts, and it's always nice to have something to do at the computer.
- ***One or two moderately complex applications*** that are specified, designed, and implemented in each chapter. The source code for these programs is on the student disk. Anyone who has written real-world applications can appreciate the importance of careful design and planning. Students, lacking that experience, should not be misled into thinking that all Visual Basic programs are trivial in size and complexity.
- ***Review questions*** at the end of each chapter. Some are no-brainers, some require thought. But you can trace the origin of every question back to a specific spot in the reading, in case you didn't read the chapter carefully enough the first time (who does?). Answers to the odd-numbered questions are in Appendix C. Answers to the even-numbered questions are printed in the Instructor Manual.
- ***End-of-Chapter programming exercises*** that offer a variety of programming challenges, from easy to difficult. The solutions to these programs are printed in the instructor's manual and are placed on the disk that accompanies the instructor's manual. In the writing of these programs, we gain valuable experience in problem solving. The programs can be fun, frustrating, exhilarating, aggravating, inspiring, and many other things. But they *do* teach you to program.
- ***A Visual Basic review tutorial*** for programmers who are experienced in other languages is available in Appendix A. This doesn't replace a beginning course in programming by any means, but it can be great for people who already know what they want to do, and just need the tools to do it.
- A ***competency exam*** located in Appendix A to help professors and students move more rapidly into Visual Basic. Students can judge their own mastery of fundamental topics, on their own time. Each question in the test is keyed to a particular topic in the Visual Basic review tutorial (Appendix A).
- ***Tutorials for VB add-ins***, Data Manager and VisData. These are handy utilities for students who do not have Microsoft *Access* available. The tutorials are in Appendix B.
- ***Programs supplied on disk*** are indicated by a small computer disk icon in the margin. A disk with the letter S inside refers to a program on the student diskette that accompanies this book. A diskette with the letter I inside refers to a program on the instructor disk that accompanies the instructor manual. The name of the directory holding the program is always shown below the disk. For example, the following icons indicate a program in the \College directory on the student disk, and a program in the \Karate1 directory on the instructor disk.

College

Karate1

A Quick Survey of Chapter Topics...

Chapters 1-10 are compatible with Visual Basic 4.0. All chapters are compatible with Visual Basic 5.0:

- Chapter 1, **Designing and Coding Programs**, explains the application development cycle, user interface design, coding guidelines, error handling, and performance optimization.

- Chapter 2, **Building an Invoice Application,** develops a point-of-sale application in several stages, introduces the common dialog control, and shows how to save and restore system registry settings.

- Chapter 3, **Arrays and Collections,** introduces objects, collections, random files, MDI applications, and an event-driven computer game that is always popular with students.

- Chapter 4, **Object-Oriented Programming,** goes head-on into object-oriented programming, with classes, objects, methods, properties, collection classes, and a complete application for scheduling doctors office appointments.

- Chapter 5, **Introducing Databases,** shows how to create a database, use the data, data-bound grid, list, and combo controls, and shows how to use Seek and FindFirst to search for records.

- Chapter 6, **Data Access Objects,** concentrates on data access objects and multi-user databases, and develops two database applications in stages.

- Chapter 7, **Relational Databases,** shows how to design multi-table databases, create SQL queries and data definition statements, create validation rules, and goes through the steps of coding a multi-table database application.

- Chapter 8, **Reports and Online Help,** shows how to use Crystal Reports to create professional-looking reports, and how to create online help files for users of an application.

- Chapter 9, **Object Linking and Embedding,** introduces object linking and embedding (OLE), showing how to integrate Visual Basic with Microsoft Word and Excel, using OLE containers and objects.

- Chapter 10, **Tapping into the Windows API,** focuses on calling DLL procedures and taking advantage of the Windows *application programmer's interface* (API).

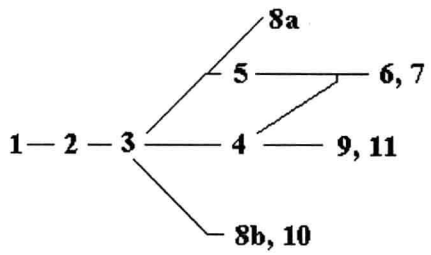
- Chapter 11, **Creating ActiveX Components,** shows how to create ActiveX components using Visual Basic 5, with examples of ActiveX controls, a DLL, and an out-of-process component server.

- Appendix A: **Visual Basic Review,** is a quick-start tutorial on the essentials of Visual Basic for readers who are already experienced programmers.

- Appendix B: **Standard VB4 Add-Ins,** is a tutorial on using the VisData, Data Manager, and Data Form Designer programs that are shipped with Visual Basic 4.

- Appendix C: **Answers to Odd-Numbered Review Questions,** contains answers to the review questions located at the end of each chapter. (The even-numbered answers are supplied in the Instructor's manual.)

Chapter Sequence Flowchart. It is often more useful for professors to cover chapters in a different order from the sequence presented in the book. The following sequences of chapters are possible, given built-in dependencies between topics:



* Chapter 8a indicates Crystal Reports, and Chapter 8b indicates Online Help.

Immediately after Chapter 3, you can cover Chapters 5, 8, and 10 without any difficulties. After Chapter 4, Chapters 9 and 11 may be covered. After Chapters 4 and 5, Chapters 6 and 7 may be covered. One alternate approach, for example, is to begin databases before object-oriented programming, so the sequence would be 1-3, 5, 4, 5-6, 8-11. Another approach would be to emphasize ActiveX controls earlier in the course, so the sequence would be 1-3, 4, 11, 5-7, 8, 9, 10.

Supplemental Materials and Teaching Aids

The following learning aids are furnished with each copy of the book:

- Review Questions at the end of each chapter.
- Answers to the odd-numbered review questions in Appendix C.
- A disk containing all sample programs.

- Access to the following author and publisher Web sites where additional sample programs are available:

  http://www.pobox.com/~irvinek/vbook
  http://www.scottjonespub.com

The following teaching aids are furnished to the instructor in the instructor's guide:

- A printed test bank of short-answer, multiple-choice and True/False questions, with two sets of 40 questions per chapter.
- Additional programming exercises designed to enhance the use of this book.
- Answers to all even-numbered review questions in the book.
- A disk containing the test bank questions for each chapter.
- A disk containing solution programs for all programming exercises in the book. Updated solutions and additional programming exercises will be posted on the author and publisher web sites listed earlier. (Files exclusively for instructor use will be encrypted with password-protection.)

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TypeSetting

Typesetting of this book was done by Kip Irvine, using Microsoft Word 97. Any suggestions, criticism, and locations of misprints would be warmly appreciated. Please send e-mail to: **kip.irvine@pobox.com** or call Kip Irvine at **305-237-2806** (Miami-Dade Community College). The editor, Richard Jones, can be reached at: **Scotjones1@aol.com**.

About the Author

Kip Irvine holds a M.S. (computer science) and D.M.A. (music composition) from University of Miami; Professor of Computer Information Systems, Miami-Dade Community College-Kendall, 1983+; published textbooks are *COBOL for the IBM Personal Computer* (Prentice Hall, 1987), *Assembly Language for the IBM-PC* (Macmillan, 1990 & 1993), *C++ and Object-Oriented Programming* (Prentice Hall, 1997), and the current book, *Advanced Visual Basic*. His other interests are Tae Kwon Do, 'Cello playing, and sailing. He grew up making surfboards in Hawai'i and surviving the Pipeline.

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