

CONTENTS IN DETAIL

ACKNOWLEDGMENTS

xxi

INTRODUCTION	1
A Programming Primer	2
The Principles of Writing a Computer Program	2
The Principles of Programming Languages	3
The Philosophy Behind Programming Languages	5
The Philosophy Behind the BASIC Programming Language	7
The Philosophy Behind Visual Basic	8
How Visual Basic Works	9
How This Book Is Organized	10

PART I **LEARNING THE VB EXPRESS USER INTERFACE**

1	
YOUR FIRST VISUAL BASIC PROGRAM	13
Step 1: Create a Visual Basic Project	14
Step 2: Design a User Interface	16
Step 3: Write BASIC Code	20
Step 4: Run Your Program	23
Where to Go from Here	25
2	
UNDERSTANDING THE VISUAL BASIC EXPRESS INTERFACE	27
Understanding Pull-Down Menus	27
Hands-on Tutorial: Using Pull-Down Menus	29
Understanding Toolbars	30
Deciphering Toolbar Icons	31
Displaying and Hiding Toolbars	31
Customizing Toolbars	31
Hands-on Tutorial: Using Toolbars	32
Working with Windows	33
Making a Window Float	33
Docking a Window	35
Tucking Windows Out of Sight with Auto Hide	35
Displaying a Window as a Tabbed Document	36
Using Tabbed Groups	38

3	WORKING WITH PROJECTS	41
Managing Files		41
Creating a New Project		42
Adding Files to a Project		43
Saving the Files in a Project		45
Closing and Opening a Project		47
 4	 DESIGNING A USER INTERFACE	 49
Creating a User Interface		49
Creating and Deleting a Form		50
Viewing a Form in the Design Window		50
Viewing the Toolbox		51
Adding Controls on a User Interface		52
Moving Controls on a User Interface		52
Resizing Controls on a User Interface		54
Changing the Properties of a Control		55
Deleting Controls on a User Interface		57
Hands-on Tutorial: Designing a User Interface		57
 5	 WRITING AND EDITING BASIC CODE	 59
Viewing BASIC Code in the Code Window		60
Increasing the Code Window Size		60
Hiding BASIC Code Temporarily		60
Hands-on Tutorial: Viewing BASIC Code in the Code Window		62
Typing BASIC Code		63
Using Syntax Prompts		63
Using AutoCorrect		63
Using IntelliSense Code Snippets		64
Hands-on Tutorial: Writing BASIC Code		66
Navigating in the Code Window		67
Searching for Text with the Quick Find Command		68
Jumping to a Specific Line Number		68
Hands-on Tutorial: Navigating in the Code Window		69
 6	 GETTING HELP	 71
Browsing the Contents		71
Searching for Help		72
Looking in the Index		73
Using the How Do I Feature		75
Using Dynamic Help		75

PART II

DESIGNING A USER INTERFACE

7	UNDERSTANDING CONTROLS AND PROPERTIES	79
Using the Toolbox	80	
Understanding Properties	80	
Opening the Properties Window	80	
Viewing a Control's Properties	81	
Editing a Control's Properties	82	
Understanding Common Properties	82	
Defining the Tab Order of Controls	84	
Hands-on Tutorial: Playing with Controls and Properties	85	
8	USING THE APPEARANCE PROPERTIES	87
Properties for Modifying Text	88	
Modifying the Text Property	89	
Changing the Text Property Font	90	
Aligning Text Within an Object	91	
Hands-on Tutorial: Modifying Text Properties	92	
Properties for Modifying Colors	92	
Changing the BackColor and ForeColor Properties	93	
Properties for Defining User Interaction	93	
Changing the Mouse Pointer	94	
Changing the Appearance of a Control	94	
Hands-on Tutorial: Modifying the Appearance of a Control	95	
Properties for Modifying Images	96	
Using the BackgroundImage Property	97	
Using the Image Property	98	
9	USING THE LAYOUT AND BEHAVIOR PROPERTIES	101
Changing the Layout Properties	101	
Docking a Control	102	
Anchoring a Control	103	
Defining the MaximumSize and MinimumSize	105	
Hands-on Tutorial: Anchoring Controls	106	
Changing the Behavior Properties	106	
Defining the AutoSize Property	107	
Defining the ContextMenuStrip Property	107	
Disabling a Control with the Enabled and Visible Properties	109	
Hands-on Tutorial: Dimming and Hiding Controls	110	

10	DESIGNING THE WINDOWS OF A USER INTERFACE	113
Creating and Deleting a Form		113
Displaying a Form		114
Displaying a Startup Form		114
Showing and Hiding a Form		114
Hands-on Tutorial: Showing and Hiding a Form		115
Defining a Form's Layout		117
Defining the Position of a Form		117
Defining a Form's Controls		118
Defining a Form's Appearance		119
Defining a Form Size		119
Making a Form Transparent		120
Aligning Controls on a Form		120
Using Guides		120
Aligning Controls with the Format Menu Commands		121
Resizing Controls		122
Grouping Controls		122
Locking Controls		123

PART III

GETTING AND DISPLAYING DATA ON A USER INTERFACE

11	WRITING EVENT PROCEDURES	127
Creating Event Procedures		129
Creating an Event Procedure by Double-Clicking		129
Creating Event Procedures for a Control		129
Writing BASIC Code into an Event Procedure		130
Using Code Snippets		131
Using BASIC Commands		132
Hands-on Tutorial: Writing BASIC Commands		133
Retrieving Data from the User Interface		135
Hands-on Tutorial: Getting Data from a Control		136

12	DISPLAYING COMMANDS IN BUTTONS AND MENUS	139
Using Buttons		140
Creating Pull-Down Menus		140
Creating Generic Pull-Down Menus		141
Creating a Pull-Down Menu from Scratch		142
Editing Pull-Down Menus and Commands		143
Deleting a Menu Title or Command		143
Adding a Menu Title		143
Adding a Menu Command		143

Adding a Submenu	143
Editing Menu Titles and Commands	144
Defining Hot Keys for Menu Titles and Menu Commands	145
Rearranging Menu Titles and Commands	145
Adding Extra Features to a Pull-Down Menu	146
Adding Separator Bars	146
Making Shortcut Keys	147
Adding Check Marks	149
Adding Icons	150
Hands-on Tutorial: Creating Pull-Down Menus	151
Making a ToolStrip	152
Rearranging ToolStrip Commands	154
Deleting ToolStrip Commands	154
Adding Items to Drop-Down Buttons and Split Buttons	154
Adding Options to a Combo Box	155
Adding a Text Box to a ToolStrip	156
Grouping Commands on a ToolStrip	156
Adding a Progress Bar to a ToolStrip	156
Hands-on Tutorial: Creating Toolstrips	157

13

OFFERING CHOICES WITH RADIO BUTTONS AND BOXES

159

Using Radio Buttons	159
Grouping Radio Buttons	160
Customizing a Radio Button	160
Hands-on Tutorial: Grouping Radio Buttons	162
Using Check Boxes	163
Using List Boxes	164
Filling a List Box with Items	165
Displaying Items in a List Box	165
Selecting Items in a List Box	166
Hands-on Tutorial: Retrieving One Item from a List Box	166
Hands-on Tutorial: Retrieving Multiple Items Using the SelectedItems.Item Property	168
Using a Checked List Box	170
Hands-on Tutorial: Using a Checked List Box	171
Using Combo Boxes	172
Filling a Combo Box with Items	173
Changing the Appearance of a Combo Box	173
Sorting Items in a Combo Box	174
Hands-on Tutorial: Selecting Items in a Combo Box	174

14

ACCEPTING AND DISPLAYING TEXT IN TEXT BOXES AND LABELS

177

Using Labels	177
Using Link Labels	179
Filling the Text and Links Properties	180
Displaying Colors	180

Hands-on Tutorial: Playing with LinkLabels	181
Using Text Boxes	182
Modifying the Behavior of a Text Box	182
Hiding Text in a Text Box	183
Using a Masked Text Box	184
Hands-on Tutorial: Playing with Masked Text Boxes	185

15

ACCEPTING A RANGE OF NUMERIC VALUES 187

Using Scroll Bars	187
Hands-on Tutorial: Creating Scroll Bars and TrackBars	189
Displaying Numbers with the NumericUpDown Control	191
Hands-on Tutorial: Using the NumericUpDown Control	192
Choosing Dates	192
Using the MonthCalendar Control	193
Using the DateTimePicker Control	194
Hands-on Tutorial: Selecting Dates with the DateTimePicker and MonthCalendar Controls	194

16

DESIGNING A FORM WITH LAYOUT CONTROLS 197

Using Panels	198
Using a FlowLayoutPanel	199
Using a TableLayoutPanel	200
Using a TabControl	203
Creating a TabControl	203
Selecting a TabControl or Individual Tab Pages	204
Adding and Deleting Tabs	205
Rearranging Tabs	205
Using a SplitContainer	205
Creating a SplitContainer	206
Customizing Panels in a SplitContainer	206
Hands-on Tutorial: Understanding Different Layout Controls	207
Editing Layout Controls	208
Docking a Layout Control	208
Moving a Layout Control	209
Deleting a Layout Control	210

17

DISPLAYING DIALOG BOXES 211

Creating and Displaying a Dialog Box	212
Hands-on Tutorial: Opening and Using a Color Dialog Box	213
Using the Open and Save Dialog Boxes	213
Defining Filters	214

Hands-on Tutorial: Retrieving a Filename from a Dialog Box	215
Using the Folder Browser Dialog Box	216
Hands-on Tutorial: Using a Folder Browser Dialog Box	217
Using the Font Dialog Box	218
Hands-on Tutorial: Using the Font Dialog Box	218
Using the Color Dialog Box	219
Making Your Own Dialog Box	220
Creating a Message Box with the MsgBox Command	220
Hands-on Tutorial: Using the MsgBox Command	223
Creating a Different Message Box with the MessageBox Command	224
Hands-on Tutorial: Using the MessageBox Command	225
Creating an Input Box	226
Hands-on Tutorial: Using an Input Box	227

PART IV WRITING BASIC CODE

18 USING VARIABLES AND CONSTANTS 231

Declaring Variables	232
Defining a Data Type	233
Declaring Variables as a Date	237
Declaring Variables as Boolean and Character Values	238
Naming a Variable	238
Defining the Scope of a Variable	239
Defining Procedure Scope	239
Defining Block Scope	239
Defining Module Scope	240
Defining Namespace Scope	241
Variable Declaration Shortcuts	242
Declaring Multiple Variables on a Single Line	242
Declaring a Variable and Assigning an Initial Value on a Single Line	243
Declaring Constants	243
Hands-on Tutorial: Declaring Variables and Constants	244

19 MATHEMATICAL OPERATORS 247

Using Mathematical Operators	248
Understanding Operator Precedence	249
Defining Your Own Operator Precedence	250
Using Mathematical Methods	251
Using Assignment Operators	252
Converting String Data Types to Numeric Data Types	254
Hands-on Tutorial: Playing with Mathematical Methods	255

20

STRING MANIPULATION

259

Concatenating a String	259
Concatenating Multiple Strings	260
Concatenating Multiple Strings Stored in an Array	261
Hands-on Tutorial: Concatenating Multiple Strings	261
Counting Characters in a String	262
Trimming Strings	262
Removing Characters from a String	264
Padding a String	264
Searching Strings	265
Retrieving Single Characters with the Chars Property	265
Searching for the Position of a Specific Character	266
Searching for the Position of a String Within Another String	266
Hands-on Tutorial: Searching Strings	267
Comparing Strings	268
String.Compare	269
Comparing Strings with the Like Operator	269
Matching Strings	269
Pattern Matching with the Single-Character Wildcard	270
Pattern Matching with the Multiple-Character Wildcard	271
Pattern Matching with the Single Numeric-Character Wildcard	271
Pattern Matching with Lists	271
Hands-on Tutorial: Comparing Strings	273
Replacing Strings	274
Extracting Strings	276
Hands-on Tutorial: Extracting Strings	277
Converting Strings	278
Reversing Strings	279

21

DECISION-MAKING STATEMENTS

281

Understanding Conditional Expressions	282
How Comparison Operators Work	282
Comparing Characters and Strings	283
Combining Conditional Expressions	284
Using the And Logical Operator	284
Using the Or Logical Operator	285
Using the Xor Logical Operator	286
Using the Not Logical Operator	287
Using an If-Then Statement	287
Using an If-Then-Else Statement	288
Using an If-Then-Elseif Structure	290
Using a Select-Case Structure	290
Selecting from a Range of Values	291
Using Comparison Operators	292
Hands-on Tutorial: Playing with Conditional Expressions	292

22	REPEATING CODE WITH LOOPS	295
Using a For-Next Loop		296
Counting by Different Step Increments		297
Skipping an Iteration		298
Exiting a Loop		298
Hands-on Tutorial: Playing with For-Next Loops		299
Loops That Run Zero or More Times		300
Loops That Run at Least Once		302
Exiting from a Do-While/Do-Until Loop Prematurely		303
Hands-on Tutorial: Playing with Do-While Loops		303

23	DATA STRUCTURES: STRUCTURES, ARRAYS, AND COLLECTIONS	305
Using a Structure		306
Declaring and Defining a Structure		306
Storing and Retrieving Data in a Structure		307
Using an Array		308
Storing and Retrieving Data from an Array		308
Defining the Size of an Array		309
Resizing an Array		309
Initializing an Array		310
Creating Multidimensional Arrays		311
Manipulating Arrays		312
Hands-on Tutorial: Storing a Structure in an Array		317
Using a Collection		319
The Parts of a Collection		319
Storing Data in a Collection		320
Searching for Data in a Collection		321
Removing Data from a Collection		322
Counting All the Members in a Collection		323
Using the For Each Next Loop		323
Hands-on Tutorial: Playing with Collections		324

24	ADVANCED DATA STRUCTURES: QUEUES, STACKS, AND HASH TABLES	329
Using a Queue		329
Adding Data to a Queue with the Enqueue Method		330
Checking the Contents of a Queue		330
Counting the Contents of a Queue		331
Removing Data from a Queue		331
Copying Data from a Queue to an Array		333
Using a Stack		334
Pushing Data		335
Checking the Contents of a Stack		335

Counting the Contents of a Stack	336
Popping Data from a Stack	336
Copying Data from a Queue to an Array	337
Using a Hash Table	338
Adding Data to a Hash Table	339
Retrieving Data from a Hash Table	339
Copying Data from a Hash Table to an Array	340
Counting Data in a Hash Table	341
Checking Whether Keys or Data Are Stored in a Hash Table	341
Removing Data from a Hash Table	342
Hands-on Tutorial: Playing with Queues, Stacks, and Hash Tables	343

25

CREATING PROCEDURES AND FUNCTIONS 345

Creating a General Procedure	346
Storing Procedures in Form and Module Files	347
Creating a General Procedure in a Form File	347
Creating a General Procedure in a Module File	348
Hands-on Tutorial: Creating a Procedure in a Module File	349
Passing Parameters to Procedures	350
Adding Multiple Items to a Parameter List	351
Modifying Data in a Procedure	351
Hands-on Tutorial: Passing Parameters to a Procedure	352
Creating a Function	353

26

UNDERSTANDING OBJECT-ORIENTED PROGRAMMING 355

Understanding Encapsulation	356
Understanding Inheritance	357
Understanding Polymorphism	357
Problems with Object-Oriented Programming	358
Designing Objects	359
Working with Objects in Visual Basic	360
Creating a Class File	360
Writing Code in a Class File	361
Writing Methods to Change Data	364
Declaring an Object	365
Hands-on Tutorial: Creating and Using Objects	365
Working with Inheritance	367
Hands-on Tutorial: Inheriting from Objects	367
Working with Polymorphism	370
Hands-on Tutorial: Playing with Polymorphism	371

27	COMMENTS, ERROR HANDLING, AND DEBUGGING	375
Identifying Bugs		376
Identifying Syntax Errors		376
Identifying Logic Errors		376
Identifying Run-Time Errors		377
Clarifying Your Code		377
Keep Programs Short		378
Write Simple Code		378
Use Descriptive Names for Variables		378
Adding Comments		378
Trapping Errors		381
Hands-on Tutorial: Catching Errors with the Try-Catch Statement		381
Debugging Your Program		383
Stepping Line by Line		383
Watching Your Variables		384
Changing the Values of Your Variables		385
Hands-on Tutorial: Watching a Variable		386
Stepping Over and Stepping Out of Procedures		387
Using Breakpoints		388
Stop Debugging		390
Hands-on Tutorial: Debugging a Program		390

PART V

ENHANCING YOUR VISUAL BASIC PROGRAMS

28	CONNECTING TO FILES AND DATABASES	395
Using Text Files		396
Creating and Storing Data in a Text File		396
Reading Data from a Text File		397
Hands-on Tutorial: Reading and Writing Text Files		397
Using Database Files		399
Understanding Database Files		399
Linking Database Files to a Visual Basic Project		399
Connecting a Database File to a Visual Basic Project		400
Defining a Data Source and Creating a Data Set Control		400
Creating a Data Adapter Control		403
Viewing Data in a Visual Basic Project		403
Saving Data to a Database		406
Hands-on Tutorial: Using the DataGridView Control		407
Hands-on Tutorial: Using the BindingNavigator Control		409

Preparing Your Program to Print	413
Writing BASIC Code to Print Data	414
Printing Text	415
Printing Graphic Files	416
Printing Lines	416
Hands-on Tutorial: Printing Text	417
Using the PrintDialog Control	418
Displaying a Print Preview	420
Using the PrintPreviewDialog Control	420
Using the PrintPreview Control	421
Hands-on Tutorial: Displaying a Print Preview	421
Using the PageSetupDialog Control	422
Hands-on Tutorial: Displaying a Page Setup Dialog Box	423

Playing Sounds	425
Displaying Pictures	427
Viewing Web Pages	428
Using Resources	428
Storing Short Strings in the Resources Folder	429
Creating and Storing a Text File in the Resources Folder	430
Creating and Adding an Image to the Resources Folder	431
Adding an Existing File to the Resources Folder	432
Using a Resource with BASIC Code	432
Hands-on Tutorial: Using Resources	433
Compiling a Visual Basic Project	434

PRINTING DATA FROM YOUR PROGRAM

Preparing Your Program to Print	413
Writing BASIC Code to Print Data	414
Printing Text	415
Printing Graphic Files	416
Printing Lines	416
Hands-on Tutorial: Printing Text	417
Using the PrintDialog Control	418
Displaying a Print Preview	420
Using the PrintPreviewDialog Control	420
Using the PrintPreview Control	421
Hands-on Tutorial: Displaying a Print Preview	421
Using the PageSetupDialog Control	422
Hands-on Tutorial: Displaying a Page Setup Dialog Box	423

ADDING THE FINISHING TOUCHES TO YOUR PROGRAM

Playing Sounds	425
Displaying Pictures	427
Viewing Web Pages	428
Using Resources	428
Storing Short Strings in the Resources Folder	429
Creating and Storing a Text File in the Resources Folder	430
Creating and Adding an Image to the Resources Folder	431
Adding an Existing File to the Resources Folder	432
Using a Resource with BASIC Code	432
Hands-on Tutorial: Using Resources	433
Compiling a Visual Basic Project	434

INDEX

PRINTING DATA FROM YOUR PROGRAM

Preparing Your Program to Print	413
Writing BASIC Code to Print Data	414
Printing Text	415
Printing Graphic Files	416
Printing Lines	416
Hands-on Tutorial: Printing Text	417
Using the PrintDialog Control	418
Displaying a Print Preview	420
Using the PrintPreviewDialog Control	420
Using the PrintPreview Control	421
Hands-on Tutorial: Displaying a Print Preview	421
Using the PageSetupDialog Control	422
Hands-on Tutorial: Displaying a Page Setup Dialog Box	423

ADDING THE FINISHING TOUCHES TO YOUR PROGRAM

Playing Sounds	425
Displaying Pictures	427
Viewing Web Pages	428
Using Resources	428
Storing Short Strings in the Resources Folder	429
Creating and Storing a Text File in the Resources Folder	430
Creating and Adding an Image to the Resources Folder	431
Adding an Existing File to the Resources Folder	432
Using a Resource with BASIC Code	432
Hands-on Tutorial: Using Resources	433
Compiling a Visual Basic Project	434