

CONTENTS AT A GLANCE

<i>Introduction</i>	<i>xxi</i>
Chapter 1: Manipulating Strings	1
Chapter 2: Working with Numbers	93
Chapter 3: Working with Dates and Times	143
Chapter 4: Using VBA to Automate Other Applications	223
Chapter 5: Creating Your Own Objects with VB Class Modules	271
Chapter 6: Advanced Class Module Techniques	305
Chapter 7: Searching and Sorting in VBA	369
Chapter 8: Creating Dynamic Data Structures Using Class Modules	431
Chapter 9: Retrieving and Setting System Information	485
Chapter 10: Managing Windows Registry Data	597
Chapter 11: The Windows Networking API	633
Chapter 12: Working with Disks and Files	701
Chapter 13: Adding Multimedia to Your Applications	809
Chapter 14: Using the Scripting Runtime Library Objects	879
Chapter 15: Writing Add-Ins for the Visual Basic IDE	931
Appendix A: The Reddick VBA Naming Conventions, Version 6	999
<i>Index</i>	<i>1025</i>

TABLE OF CONTENTS

	<i>Introduction</i>	<i>xxi</i>
Chapter 1	Manipulating Strings	1
	How Does VBA Store Strings?	3
	Unicode versus ANSI	4
	Using Built-In String Functions	6
	Comparing Strings	6
	Converting Strings	10
	Creating Strings: The Space and String Functions	11
	Calculating the Length of a String	12
	Formatting Data	12
	Reversing a String	18
	Justifying a String	19
	Searching for a String	21
	Working with Portions of a String	24
	Replacing Portions of a String	26
	Search and Replace in Strings	27
	Working with Arrays of Strings	28
	ANSI Values	35
	Working with Bytes	36
	Putting the Functions Together	38
	Searching for and Replacing Text	39
	Replacing Any Character in a List with Another Character	39
	Removing All Extra White Space	43
	Removing Trailing Null and Padding from a String	44
	Replacing Numbered Tokens within a String	46
	Gathering Information about Strings	49
	Determining the Characteristics of a Character	49
	Counting the Number of Times a Substring Appears	53
	Counting the Number of Tokens in a Delimited String	55
	Counting the Number of Words in a String	57
	Converting Strings	58
	Converting a Number into a String with the Correct Ordinal Suffix	59
	Converting a Number into Roman Numerals	60
	Performing a “Smart” Proper Case Conversion	63
	Encrypting/Decrypting Text Using XOR Encryption	71

	Returning a String Left-Padded or Right-Padded to a Specified Width	75
	Using Soundex to Compare Strings	77
	Working with Substrings	81
	Returning a Specific Word, by Index, from a String	82
	Retrieving the First or Last Word in a String	86
	Converting a Delimited String into a Collection of Tokens	88
	Summary	92
Chapter 2	Working with Numbers	93
	How Does VBA Store Numeric Values?	94
	Whole Numbers	97
	Floating-Point Numbers and the Errors They Can Cause	98
	Scaled Integers	102
	Using Built-In Numeric Functions	105
	Mathematical and Trigonometric Functions	105
	Numeric Conversions and Rounding	109
	Random Numbers	116
	Financial Functions	120
	Base Conversions	125
	Custom Math and Numeric Functions	129
	Mathematical Functions	130
	Geometric Calculations	132
	Statistics	136
	Summary	142
Chapter 3	Working with Dates and Times	143
	What Is a Date, and How Did It Get There?	144
	An Added Benefit	145
	Supplying Date Values	146
	The Built-In VBA Date Functions	147
	Exactly When Is It?	147
	What If You Just Want One Portion of a Date/Time Value?	149
	Pulling the Pieces Apart	149
	Performing Simple Calculations	153
	Odd Behaviors	159
	Displaying Values the Way You Want	160
	Beyond the Basics	167
	Finding a Specific Date	168
	Finding the Beginning or End of a Month	169
	Finding the Beginning or End of a Week	170
	Finding the Beginning or End of a Year	172

Finding the Beginning or End of a Quarter	173	
Finding the Next or Previous Weekday	176	
Finding the Next Anniversary	178	
Finding the <i>n</i> th Particular Weekday in a Month	180	
Working with Workdays	182	
Finding the Next, Previous, First, or Last		
Workday in the Month	186	
Manipulating Dates and Times	190	
How Many Days in That Month?	190	
How Many Mondays in June?	192	
Is This a Leap Year?	194	
Rounding Times to the Nearest Increment	196	
Converting Strings or Numbers to Real Dates	199	
Working with Elapsed Time	203	
Finding Workdays between Two Dates	203	
Calculating Age	207	
Formatting Elapsed Time	209	
Formatting Cumulative Times	214	
Handling Time Zone Differences	217	
Using the SystemTimeInfo Class	218	
Summary	221	
Chapter 4	Using VBA to Automate Other Applications	223
Automation Basics	224	
Terminology	225	
What's the Value of Automation?	226	
Object Classes	227	
Type Libraries: The Key to Classes	228	
Browsing Objects with Object Browser	230	
Creating Object Instances	232	
Early Binding and Late Binding	233	
A Simple Early Binding Example	233	
When to Instantiate	236	
CreateObject and GetObject	237	
Understanding Class Instancing	240	
Controlling Other Applications	243	
Learning an Application's Object Model	243	
Differences in Application Behavior	245	
Memory and Resource Issues	246	
Creating Automation Solutions with Microsoft Office	246	
The Office Object Models	247	
Example: Word as a Report Writer	253	
Creating the Word Template	253	

	Building the Invoice	255
	Example: Populating an Excel Worksheet	260
	Using an Existing File	260
	Our Scenario	260
	Creating an Object from an Existing Document	262
	Updating the Worksheets and Chart	263
	Tapping into Events Using WithEvents	266
	What Is WithEvents?	266
	Using WithEvents	267
	Summary	270
Chapter 5	Creating Your Own Objects with VB Class Modules	271
	Why Use Class Modules?	273
	Encapsulate Data and Behavior	273
	Hide Complex Processes from Other Developers	276
	Making Development Easier	276
	How Class Modules Work	277
	Class Modules Are Like Document Templates	277
	Class Instances Are the Documents	277
	A Simple Example: A Text File Class	278
	Creating an Object Class	278
	Creating a Property	280
	Creating a Method	281
	Using the Object Class	284
	Using Property Procedures	289
	What Are Property Procedures, and Why Use Them?	289
	Retrieving Values with Property Get	289
	Setting Values with Property Let	290
	Read-Only and Write-Only Properties	292
	Creating Object Properties	292
	Creating Enumerated Types	294
	Defining an Enumerated Type	294
	Using Enumerated Types with Methods and Properties	295
	Applying Class Module Techniques to the Windows API	296
	Working with the Clipboard	297
	Designing the Clipboard Class	297
	Testing the Clipboard Class	303
	Summary	303
Chapter 6	Advanced Class Module Techniques	305
	Object Model Design Principles	307
	Determining Class Requirements	308
	Specifying Class Members	310

Object Model Naming	312	
Modeling Class Relationships	314	
Developing Object Hierarchies	315	
Creating a Parent Property	317	
Self-Referencing	319	
Collections of Objects	319	
Collection Basics	319	
Creating Your Own Collections	322	
Creating a Collection Class	324	
Collection Class Tricks	333	
Creating and Using Custom Events	339	
Defining Custom Events	339	
Raising an Event	340	
Responding to Events	342	
Using Forms with WithEvents	345	
Custom Events Caveats	347	
Interface Classes and the Implements Keyword	347	
Interface Inheritance	348	
When to Inherit	348	
Interface Inheritance Example: Callbacks	349	
Other Advanced Considerations	356	
Error Handling in Classes	356	
Circular Reference Issues	360	
Shared Classes	365	
Summary	367	
Chapter 7	Searching and Sorting in VBA	369
	Timing Is Everything	371
	Introducing the Stopwatch Class	371
	Using the Stopwatch Class	373
	Using Arrays	374
	What Is an Array, Anyway?	374
	Creating an Array	377
	Using Data in an Array	377
	Sizing an Array	378
	Using a Variant to Point to an Array	380
	Sorting Arrays	384
	How Does Quicksort Work?	385
	Watching Quicksort Run	396
	Using Quicksort	398
	Speed Considerations	399
	Sorting Collections	401
	Sorting Other Types of Data	408

	Searching	420
	Why Use the Binary Search?	420
	How Does Binary Search Work?	421
	Using Binary Search	428
	Summary	430
Chapter 8	Creating Dynamic Data Structures Using Class Modules	431
	Dynamic versus Static Data Structures	433
	Simple Dynamic Structures	434
	Recursive Dynamic Structures	434
	How Does This Apply to VBA?	435
	Retrieving a Reference to a New Item	436
	Making an Object Variable Refer to an Existing Item	437
	What If a Variable Doesn't Refer to Anything?	437
	Emulating Data Structures with Class Modules	438
	Creating a Header Class	439
	Creating a Stack	439
	Why Use a Stack?	440
	Implementing a Stack	440
	The StackItem Class	441
	Creating a Queue	448
	Why Use a Queue?	448
	Implementing a Queue	449
	Creating Ordered Linked Lists	456
	The ListItem Class	456
	The List Class	456
	Creating Binary Trees	469
	Traversing Binary Trees	469
	What's This Good For?	470
	Implementing a Binary Tree	472
	The Tree Class	473
	Adding a New Item	473
	Adding a New Node: Walking the Code	476
	Traversing the Tree	477
	Traversing a Tree: Walking the Code	479
	Optimizing the Traversals	481
	The Sample Project	481
	What Didn't We Cover?	482
	Summary	483

Chapter 9	Retrieving and Setting System Information	485
	VBA and System Information	487
	The API Functions	490
	Using the GetSystemMetrics Function	491
	Using the SystemParametersInfo Function	492
	Functions That Require Data Structures	496
	Computer and Operating System Information	501
	Using the SystemInfo Class	506
	Windows Accessibility	527
	Using the Accessibility Class	541
	Creating the Accessibility Class	542
	Keyboard Information	545
	Using the Keyboard Class	546
	Creating the Keyboard Class	551
	Memory Status	553
	Using the MemoryStatus Class	554
	Creating the MemoryStatus Class	555
	Mouse Information	558
	Using the Mouse Class	561
	Non-Client Metrics	565
	Using the NonClientMetrics Class	567
	Creating the NonClientMetrics Class	570
	Power Status	577
	Using the PowerStatus Class	580
	Screen and Window Information	583
	Using the ScreenInfo Class	589
	Creating the ScreenInfo Class	590
	System Colors	591
	Using the SystemColors Class	592
	Creating the SystemColors Class	594
	Summary	596
Chapter 10	Managing Windows Registry Data	597
	Registry Structure	599
	Referring to Registry Keys and Values	601
	VBA Registry Functions	601
	Windows Registry Functions	604
	Opening, Closing, and Creating Keys	605
	Working with Registry Values	609
	Enumerating Keys and Values	613
	An Object Model for the Registry	617
	An Overview	618

	Implementing the Classes	620
	Using the Registry Objects	629
	Summary	632
Chapter 11	The Windows Networking API	633
	Basic Network Functionality	635
	Using Common Network Dialogs	635
	Handling Network Resources Yourself	642
	Disconnecting from a Network Resource	647
	Retrieving Information about Network Resources	650
	Advanced Networking Functionality	656
	Retrieving Universal Name Information	657
	Enumerating Network Resources	663
	Putting It All Together	674
	The LAN Manager API	681
	Summary	699
Chapter 12	Working with Disks and Files	701
	The Built-In VBA Disk and File Functions	703
	The Dir Function Explained	703
	Using File Attributes	705
	Doing the Disk File Shuffle	710
	Some File Information: FileLen and FileDateTime	711
	Directory Management	711
	File I/O If You Must	716
	Getting a Handle on Files	716
	Using the Open Function	717
	Manipulating File Position	720
	Statements for Reading and Writing	721
	The Windows API: Where the Real Power Is	730
	Comparing API Functions with VBA Functions	730
	Getting Disk Information	732
	Fun with Paths	743
	A Replacement for Dir	749
	Windows Notification Functions	756
	Searching for Files	763
	Procuring Temporary Filenames	772
	Getting a (Windows) Handle on Files	773
	Windows API Dates and Times	778
	Working with File Times	782
	Using the Windows Common File Dialogs	788
	Using the CommonDlg Class	788

	Using the Windows File Open/Save Common Dialogs	795
	Summary	808
Chapter 13	Adding Multimedia to Your Applications	809
	An Introduction to Windows Multimedia	811
	Multimedia Services and MCI	811
	One-Step Multimedia	815
	Beeping Away	816
	MessageBeep: One Step Better	816
	Playing Waveform Audio with PlaySound	817
	Understanding the Media Control Interface	829
	Working with MCI Devices	829
	The MCI Command String Interface	834
	The MCI Command Message Interface	837
	Putting MCI to Work	847
	Playing Audio CDs	848
	Recording and Playing Waveform Audio	857
	Putting Digital Video in a Window	869
	Summary	877
Chapter 14	Using the Scripting Runtime Library Objects	879
	Why Is This Chapter Different?	881
	Referencing and Using SCRRUN.DLL	882
	The FileSystemObject Object	884
	Testing the Simple FileSystemObject Methods	890
	Copying and Moving Files and Folders	891
	The Drives Collection	893
	The Drive Object	894
	The Folder Object	897
	Navigating through Folders	900
	The Files Collection	902
	The File Object	903
	Methods of File Objects	905
	Retrieving a Specific File Object	908
	Modifying Attributes	909
	The TextStream Object	913
	Opening a TextStream	914
	Making the TextStream Object Work	915
	Properties of the TextStream Object	917
	Using the TextStream Object	918
	Working with the Dictionary Object	920
	Taking the Dictionary for a Spin	922

	A Simple Example	924
	Why Is a Dictionary Better Than a Collection?	928
	Summary	930
Chapter 15	Writing Add-Ins for the Visual Basic IDE	931
	Working with the IDE Object Model	934
	The Class Hierarchies	934
	Working with Windows	937
	Working with VBA Projects	943
	Modifying Project Components	949
	Manipulating Code Modules	959
	Putting It Together: An Alternative Object Model	970
	Examining Our Object Model	971
	Using Our Object Model	975
	COM Add-Ins	978
	Using the COM Add-Ins Dialog	978
	Exploring IDTExtensibility2	979
	Building a COM Add-In for the VBA IDE	982
	Using the COM Add-In Designer	983
	Specifying Add-In Load Behavior	987
	Adding the Type Library Reference	987
	Coding the Add-In	988
	Using Our Object Model	991
	Debugging, Compiling, and Distributing	993
	The Add-Ins Collection	996
	Summary	997
Appendix A	The Reddick VBA Naming Conventions, Version 6	999
	Changes to the Conventions	1000
	An Introduction to Hungarian	1001
	Tags	1002
	Creating Data Types	1004
	Constructing Procedures	1006
	Prefixes	1007
	Suffixes	1009
	Filenames	1010
	Host Application and Component Extensions to the Conventions	1010
	Summary	1024
	<i>Index</i>	1025