



Visual Basic®.NET

IN **60** MINUTES A DAY

Bruce Barstow and Tony Martin

- *Master Visual Basic .NET with a book and online workshop given by expert trainers*
- *Reinforce lessons from the book with online lectures and code listings*
- *Learn Visual Basic .NET in 20 lessons—each only 1 hour long*

A REVOLUTIONARY VIRTUAL CLASSROOM

Contents

Acknowledgments	xix
About the Authors	xxi
Introduction	xxiii
Part One The .NET Experience	1
Chapter 1 Nothing but .NET	3
What Is .NET?	3
The .NET Infrastructure	5
The Common Language Runtime	6
The Common Development Environment	6
Creating New Projects	6
The Toolbox	8
The Solution Explorer	8
The Properties Window	9
The Design Area	10
The Common Type System	13
Structured Exception Handling (SEH)	14
Assemblies and the Global Assembly Cache	14
Metadata and Attributes	15
Reflection	16
Interoperability	19
ASP.NET	20
Web Services	20
ADO.NET	21
Garbage Collection	21
Getting Help	21
Summary	22

Chapter 2	Building Visual Basic .NET Windows Applications	29
	Working with .NET Forms and Controls	29
	Forms Are Objects	30
	A Change of Events	30
	The Controls Collection	33
	Familiar Controls or Just Familiar Looking?	33
	Locations and Size in .NET	36
	Setting Width and Height	36
	Setting the Form Size Using the Size Property	37
	Controlling How Large or Small a Form Can Be	37
	Docking and Anchoring	37
	Affecting Visibility	37
	Keeping a Form on Top	38
	Changing a Form's Opacity	38
	.NET Controls	39
	The ListBox Control	39
	The CheckedListBox Control	42
	Dialog Controls	45
	The DataGrid Control	46
	The Panel Control	50
	The DateTimePicker and MonthlyCalendar Controls	50
	Dynamically Adding Controls	51
	Scrollable Forms	51
	Multiple Forms	52
	Adding New Forms	52
	The Anatomy of a Form	53
	Summary	54
Chapter 3	Examining Visual Basic .NET	57
	The Common Type System and Visual Basic .NET Types	58
	Variable Declaration in Visual Basic .NET	58
	Visual Basic .NET Types Mapped to Common Language	
	Runtime Types	59
	Value Types Versus Reference Types	60
	Strings in .NET	61
	String Construction	61
	String Concatenation	62
	String Comparison	63
	String Equality	64
	Other String Operations	64
	Intrinsic Value Types	66
	Numeric Type Members	67
	Dates and the Date Data Type	67
	Char	68
	Boolean Mishap?	69
	Conversions and Casting	69
	Operators	71

Control Structures	73
The If Statement	73
The Select Case Statement	74
While Loops	75
Do Loops	75
For Each Loops	76
For Next Loops	76
With Statements	77
Exit and Exit()	77
Arrays and ArrayLists	77
Arrays Declarations	78
Arrays Iteration	78
Resizing Arrays	79
Using ArrayLists in Visual Basic .NET	79
Procedural Code	81
Return Values	81
Passing Arguments by Value Versus by Reference	82
Optional Parameters and Default Parameter Values	82
Summary	88
Chapter 4 Debugging and Exception Handling	91
Structured Exception Handling	91
Trying and Catching	92
Finally	94
The Exception Object	94
Throwing Exceptions	95
Nested Try Blocks	96
Throwing Exceptions to a Client	98
Custom Exceptions	98
Writing Errors to the Application Event Log	99
Common Exceptions and the Exceptions Window	102
Debugging Visual Basic .NET Applications	103
Break Mode	103
Entering Break mode	103
Setting Breakpoints	104
The Call Stack	104
The Locals Window	106
The Command Window	106
Stepping Through Code	107
The Watch Window	108
Running Without the Debugger	108
Printing Debugging Information	111
Using Asserts	112
Debug and Release Modes	114
Project Debugging Properties Page	114
Edit and Continue, Debugging Options Page	115
Summary	116

Part Two	Middle-Tier Development in .NET	119
Chapter 5	Advanced .NET Windows Applications	121
	Building MDI Applications in .NET	121
	Building an MDI Parent and Child	122
	Building an MDI Child Form	122
	Adding Menus	124
	Using ImageList controls	124
	Adding Toolbars	125
	Working with StatusBar Controls	126
	Building Multipane .NET Applications	135
	The ListView Control	135
	ListView Control Collections	136
	Adding Items to a ListView Control	136
	The TreeView Control	138
	Populating a TreeView Control	138
	Displaying a Directory Structure in a TreeView Control	139
	Modifying TreeView Behavior	141
	Adding Images to TreeView Items	141
	Using GDI+ in Windows Applications	144
	GDI Namespaces	145
	The System.Drawing Enumerations	146
	Point and Size Objects	146
	The Rectangle Object	147
	Using the Graphics Object to Draw Rectangles	148
	Drawing Images Inside Rectangles	148
	Working with Fonts	149
	DrawPie and FillPie	150
	A Painting to Remember	151
	Summary	156
Chapter 6	Building Class Libraries in .NET	161
	Class Libraries	161
	Referencing Local Class Libraries	162
	Referencing Remote Class Libraries	162
	Object Oriented Programming	162
	Abstraction	162
	Encapsulation	163
	Composition/Aggregation	164
	Inheritance	164
	State	167
	Messages	167
	Behaviors	167
	Polymorphism	167
	Class Basics	169
	Declaring Classes	170
	Instantiating an Object from a Class	170

Class Member Access Modifiers	170
Private Members	170
Public Members	171
Protected Members	171
Friend Members	171
Protected Friend Members	171
Class Members	172
Field and Property Members	172
Method Members	173
Overloading Methods	173
Constructors	174
Overloading Constructors	174
Shared Constructors	175
Destructors	176
Events	177
Adding Events to a Class	177
Capturing Events in the Client	178
Handling Events with Dynamic Delegates	178
Summary	188
Chapter 7 Extending Visual Basic .NET Classes	193
Building Collection Classes	194
The Card Class	194
Building a Card Class	194
Adding Enumerated Lists	195
Controlling Construction	195
Obtaining the Card Value	197
Requirements and Class Design	197
Our Experience Can Limit Our Design	198
The Deck Class	199
Using a Simple Array	199
Using a Deck	200
Problems with the Lack of Abstraction	200
Creating a Proper Collection Class (Cards)	200
CollectionBase	201
Implementing CollectionBase Members	201
Using Our Custom Collection Class	202
Appropriate Member Access	202
Completeness: Extending Functionality	203
The Shuffle Method	204
The Draw Method	204
Replacing Overloaded Methods	206
Indirect Support Means More Support	207
When Is a Class Library Complete?	208
Extending Design Time Support with Attributes	216
Common Attributes	216
Using Attributes	217
Summary	217

Chapter 8	Implementation Inheritance	221
	<i>Understanding Implementation Inheritance</i>	221
	Single Versus Multiple Implementation Inheritance	222
	Prohibiting Instantiation of a Class	224
	Forcing Implementation of a Member	224
	Prohibiting Inheritance of a Class	225
	Preparing for Polymorphism	225
	Overriding Versus Hiding	226
	Prohibiting Redefinition of a Member	234
	What NotOverridable Cannot Do	234
	What NotOverridable Can Do	235
	Inheriting for Less?	235
	Transitive Inheritance	236
	Summary	241
Chapter 9	Interfaces and Polymorphism	247
	Interfaces	247
	Declaring an Interface	248
	Interface Members	249
	Implementing Interfaces	249
	Polymorphism Through Interfaces	251
	Interface Inheritance	253
	Implementing Common .NET Interfaces	254
	Common Interfaces	254
	Implementing IComparable	255
	Implementing IComparer	256
	Testing IComparer Implementations	259
	Implementing ICloneable	263
	Testing the ICloneable Interface	264
	Strongly Typed Clones	266
	Summary	269
Chapter 10	Data Access in .NET	275
	ADO.NET's Place in .NET Architecture	275
	The Benefits of ADO.NET	276
	Comparison of ADO and ADO.NET	276
	Centralized Data Access	277
	How Data Flow Typically Works	278
	.NET Data Providers	278
	Connection Objects	279
	Command Objects	281
	CommandType	281
	Using a Command Object with a DataReader	282
	The DataAdapter Object	282
	The DataSet Object	283
	DataView Objects	284

Persisting Changes	292
Updates Using CommandBuilder Objects	293
Submitting Changes Instead of the Entire DataSet	295
Performing DataSet Merging	296
Working with Stored Procedures	303
Calling Stored Procedures in ADO.NET	303
Summary	305
Chapter 11 Memory Management and Performance Monitoring	311
Garbage Collection	311
Inside the GC	312
Nondeterministic Finalization	313
Visual Basic 6 Automatic Memory Management	313
Visual Basic .NET Automatic Memory Management	314
Designing Objects for Collection	316
System.GC Namespace	318
Obtaining an Object's Generation	318
Forcing a Manual Collection	319
Preventing Garbage Collection for Objects	320
Determining Allocated Memory	321
Weak References	321
Avoiding Finalizers	322
Performance Monitoring	324
Performance Monitor	324
Counters and Objects	325
Common Language Runtime Memory Counters	326
Adding Counters in Performance Monitor	329
Performance Counter Objects in Server Explorer	334
Visual Basic .NET Performance Tips	335
Summary	337
Chapter 12 Threading	341
Threading Basics	341
What Is a Thread?	342
Thread with Care	343
The Thread Object	343
Advantages of Using Threads	344
Disadvantages of Using Multiple Threads	345
Creating Threads	345
Starting Thread Execution	346
Debugging Threads	348
The Debug Location Toolbar	349
The Threads Window	349
Performance Monitor	349
Threads Don't Work for Everything	351

Synchronization	353
Using SyncLock for Synchronized Access to Fields	353
Avoiding Collisions by Using ThreadStatic	353
Synchronizing Entire Objects	355
Marking Individual Methods for Synchronized Access	356
Using the Monitor Class for Synchronization	356
Synchronized Access to Managed Objects	357
Advanced Threading	360
The ThreadPool Class	360
Borrowing Threads from the Thread Pool	361
The Interlocked Class	363
The Mutex Class	364
Threading Tips	365
Summary	366
Part Three Web Technologies in .NET	371
Chapter 13 ASP.NET	373
What's the Big Deal?	373
Building ASP.NET Applications	374
Server-Side HTML Generation and Execution	379
Code Generation	379
Controls	380
Using the Controls	380
HTML Controls	381
Server Controls	381
User Controls	383
Validator Controls	383
Events and Event Handling	384
Sequence of Events	385
The All-Important Postback	386
Writing Event Handlers	387
Building Your Classes and Pages	388
Class References	389
Old and New ASP Objects	389
Storing State	390
Application State	390
The NT Service	391
The SQL Server Feature	391
Images and StyleSheets	392
The Web.Config File and Security	392
The Web.Config File	393
The SessionState Option	393
Security Options	393
Authentication	394
Authorization	395
Using Forms-Based Authentication and Authorization	396
Enterprise Development Considerations	397
Summary	405

Chapter 14	Data Control and XML in Web Applications	409
	Basics of ASP.NET Data Binding	409
	The Simple Data Controls	410
	The DataGrid Control	413
	The DataList Control	414
	Building Data Access Applications	417
	Talking Securely to the Database	417
	XML and Visual Studio .NET	427
	XML Overview	427
	XML Structure and Syntax	428
	XML Schemas	429
	Visual Studio .NET XML Tools	431
	Creating a Schema	431
	Creating XML Data	433
	Summary	441
Chapter 15	XML Web Services	445
	Introduction to Web Services	445
	Associated Technologies	450
	Universal Discovery, Description, and Integration	450
	Namespaces	451
	Simple Object Access Protocol	451
	Web Service Description Language	452
	The Proxy	453
	Web References	455
	Building Your Own Web Services	459
	Building Class Libraries	459
	Using the Web Service as an Interface	461
	Web Service Security	464
	Summary	478
Part Four	Distribution and Interoperability in .NET	483
Chapter 16	Interoperability	485
	Consuming COM Components from .NET	485
	Using COM DLLs in .NET	486
	Using OCX Controls in .NET	488
	Handling COM Exceptions in .NET	489
	Consuming .NET Components from COM	495
	Creating Strongly Named Assemblies	496
	Installing Assemblies into the GAC	497
	Installing an Assembly into the GAC	497
	Registering .NET Assemblies with COM	498
	Non-COM DLL Interoperability	504
	Summary	506
Chapter 17	Mobile Internet Toolkit	511
	Background	511
	Essentials	512
	The Mobile Device	513

Designing Content for Mobile Devices	513
The Tools You'll Need	514
Getting Your Development Environment Ready	515
Install the Toolkit	515
Install the Mobile Explorer	515
Using a Real Mobile Device	515
Building Mobile Web Content	516
Six Steps to Mobile Web Development	516
Pages and Forms	517
Some More Depth	524
Surveying the Mobile Controls	524
The Form Control	525
The Label Control	526
The Command Control	526
The Text Control	526
The TextView Control	526
The Link Control	527
The List Control	527
The SelectList Control	527
The ObjectList Control	528
The Calendar Control	528
The PhoneCall Control	528
And the Rest	529
Displaying Images	529
Designing Your Images	529
Displaying Your Images	529
Mobile Capabilities Object	530
Validating User Input	531
Content Pagination	532
How Pagination Works	532
The Pagination Decision	533
Mobile Data Binding	533
Summary	545
Chapter 18 Localization and Globalization	549
Localization Fundamentals	549
Leave Translation to Translators	550
Set Up Your Local Machine for Multiple Cultures	551
CultureInfo	551
Culture Types	553
TextInfo, DateTimeFormatInfo,	
and NumberFormatInfo Objects	554
Adding Resources to .NET Assemblies	561
The Resource Generator Utility (resgen.exe)	561
The Windows Resource Localization Editor (winres.exe)	563

Creating Resource Files with ResourceWriter	563
Localizing Windows Forms	565
Testing for Localizability	572
Summary	573
Chapter 19 Visual Basic 6 to Visual Basic .NET Migration	577
Migrating Mindset	578
Migrating Code	579
Introducing the Upgrade Wizard	580
Migrating Visual Basic 6 Project Types	580
Form Migration	581
Migrating Form Events	582
Loading, Instantiating, and Showing Forms	582
Data Type Migration	583
MDI Code Migration	584
ActiveMDIChild	585
Standard Control Migration	585
Visual Basic 6 Control Properties Removed	
or Changed in .NET	586
Control Event Migration	587
Migrating Control Arrays and Bound Objects	587
Migrating Numbers Instead of Named Constants	591
Clipboard Object Changes	593
Screen Object Changes	593
App Object Changes	593
Migrating Size and Scale Related Code	594
Win32API Call Migration	594
Migrating Anomalies	595
Declaration Anomaly	595
ByRef Procedure Call Anomaly	596
Migrating Data Access Methodologies	597
Migrating Use of Default Properties	597
Migrating Late Bound Code	598
Variant Issues	598
Postmigration Optimization and Advice	599
Summary	609
Chapter 20 Distributing .NET Projects	613
Some Background	613
Installer Concepts	614
Uninstall	614
Namespaces	615
Assemblies	617
The Manifest	618
Tracking Down Assemblies	619

xviii Contents

Building Installations	619
The Microsoft Installer	619
The Installation Creation Process	621
Starting Out	622
The Editors	623
The File System Editor	623
The File Types Editor	625
The Registry Editor	626
The User Interface Editor	627
The Launch Conditions Editor	628
The Custom Actions Editor	629
Summary	644
Appendix A Installing .NET	647
Appendix B About the 60 Minutes Web Site	651
Appendix C Glossary	655
Index	661