

CONTENTS

INTRODUCTION

xxxv

PART I: LANGUAGE CONSTRUCTS AND ENVIRONMENT

CHAPTER 1: VISUAL STUDIO 2010	3
Visual Studio 2010: Express through Ultimate	4
Visual Basic Keywords and Syntax	7
Console Applications	10
Creating a Project from a Project Template	11
The Solution Explorer	14
Project Properties	15
Assembly Information Screen	16
Compiler Settings	17
Debug Properties	21
References	22
Resources	24
Settings	25
Other Project Property Tabs	28
Project ProVB_VS2010	28
Form Properties Set in Code	31
Additional Components for Visual Studio	39
Enhancing a Sample Application	40
Customizing the Code	41
Building Applications	45
Reusing Your First Windows Form	52
Useful Features of Visual Studio 2010	54
Build Configurations	54
The Task List	56
The Command Window	57
Server Explorer	57
Recording and Using Macros in Visual Studio 2010	58
Class Diagrams	60
Application Lifecycle Management	61
Performance Tools	64
Summary	66

CHAPTER 2: OBJECTS AND VISUAL BASIC	67
Object-Oriented Terminology	68
Objects, Classes, and Instances	68
Composition of an Object	69
System.Object	72
Working With Visual Basic Types	72
Value and Reference Types	73
Primitive Types	75
Commands: Conditional	76
If Then	77
Comparison Operators	77
Select Case	79
Value Types (Structures)	79
Boolean	80
Integer Types	81
Unsigned Types	82
Decimal Types	82
Char and Byte	85
DateTime	85
Reference Types (Classes)	86
The Object Class	86
The String Class	87
XML Literals	91
The DBNull Class and IsDBNull Function	92
Parameter Passing	93
ParamArray	94
Variable Scope	94
Working with Objects	95
Objects Declaration and Instantiation	95
Object References	96
Dereferencing Objects	97
Early Binding versus Late Binding	97
Data Type Conversions	98
Performing Explicit Conversions	99
Creating Classes	103
Basic Classes	103
Handling Events	113
Handling Multiple Events	113

The WithEvents Keyword	114
Raising Events	114
Declaring and Raising Custom Events	115
Receiving Events with WithEvents	116
Receiving Events with AddHandler	117
Constructor Methods	119
Termination and Cleanup	119
Advanced Concepts	120
Overloading Methods	121
Overloading Constructor Methods	123
Shared Methods, Variables, and Events	124
Operator Overloading	128
Delegates	130
Classes versus Components	134
Lambdas	135
Summary	136
CHAPTER 3: CUSTOM OBJECTS	137
Inheritance	138
Implementing Inheritance	139
Interacting with the Base Class, Your Class, and Your Object	159
Simple Constructors	164
Creating an Abstract Base Class	175
Multiple Interfaces	177
Object Interfaces	177
Secondary Interfaces	178
Abstraction	184
Encapsulation	187
Polymorphism	189
Method Signatures	189
Inheritance	198
When to Use Inheritance	198
How Deep to Go?	205
Summary	208
CHAPTER 4: THE COMMON LANGUAGE RUNTIME	211
Elements of a .NET Application	212
Modules	212
Assemblies	213
Types	214

Versioning and Deployment	214
Better Support for Versioning	214
Major.Minor.Build.Revision	215
Better Deployment	215
Cross-Language Integration	216
The Common Type System	216
Metadata	217
Better Support for Metadata	218
Attributes	218
The Reflection API	220
IL Disassembler	221
Memory Management	221
Traditional Garbage Collection	222
Faster Memory Allocation for Objects	228
Garbage Collector Optimizations	229
Namespaces	231
What Is a Namespace?	231
Namespaces and References	234
Common Namespaces	236
Importing and Aliasing Namespaces	238
Aliasing Namespaces	239
Referencing Namespaces in ASP.NET	240
Creating Your Own Namespaces	240
The My Keyword	242
My.Application	243
My.Computer	246
My.Forms Namespace	249
My.Resources	249
My.User	250
Extending the My Namespace	250
Summary	252
CHAPTER 5: DECLARATIVE PROGRAMMING WITH VISUAL BASIC	253
Declarative Programming and Visual Basic	254
Using XAML to Create a Window	255
XAML Syntax	258
XAML Language Basics	259
XAML Directives	261
Using XAML to Declare a Workflow	262
Summary	264

CHAPTER 6: EXCEPTION HANDLING AND DEBUGGING	267
New in Visual Studio 2010 Team System: Historical Debugging	267
Notes on Compatibility with VB6	268
Exceptions in .NET	268
Important Properties and Methods of an Exception	268
Structured Exception-Handling Keywords	269
The Try, Catch, and Finally Keywords	270
The Throw Keyword	271
Throwing a New Exception	272
The Exit Try Statement	273
Nested Try Structures	274
Using Exception Properties	275
The Message Property	276
The InnerException and TargetSite Properties	276
Interoperability with VB6-Style Error Handling	279
Error Logging	280
The Event Log	280
Events, Methods, and Properties	281
Writing to Trace Files	283
Summary	284
CHAPTER 7: TEST-DRIVEN DEVELOPMENT	287
When and How to Test	288
Using Assertions	288
TDD Tools in Visual Studio	290
UnitTesting Walk-Through	291
Creating a Test	291
Running a Test	293
Testing Data Access Code	295
Using the Generate from Usage Feature	302
Other Visual Studio Editions	305
Third Party Testing Frameworks	306
Summary	307
PART II: BUSINESS OBJECTS AND DATA ACCESS	
CHAPTER 8: ARRAYS, COLLECTIONS, AND GENERICS	311
Arrays	312
Multidimensional Arrays	313
The UBound Function	314

The ReDim Statement	314
The Preserve Keyword	315
Collections	315
Generics	320
Using Generics	321
Nullable Types	322
Generic Types	322
Generic Methods	326
Creating Generics	327
Generic Types	327
Generic Methods	333
Constraints	334
Generics and Late Binding	337
Covariance and Contravariance	337
Summary	339
CHAPTER 9: USING XML WITH VISUAL BASIC	341
<hr/>	
An Introduction to XML	342
XML Serialization	343
Source Code Style Attributes	347
System.Xml Document Support	348
XML Stream-Style Parsers	348
Writing an XML Stream	349
Reading an XML Stream	351
Document Object Model (DOM)	359
XSL Transformations	363
XSLT Transforming between XML Standards	366
Other Classes and Interfaces in System.Xml.Xsl	368
XML in ASP.NET	369
The XmlDataSource Server Control	369
The XmlDataSource Control's Namespace Problem	373
The Xml Server Control	373
LINQ to XML	375
LINQ Helper XML Objects	375
XDocument	375
XElement	375
XNamespace	376
XAttribute	378
Visual Basic and XML Literals	379
Using LINQ to Query XML Documents	380

Querying Static XML Documents	380
Querying Dynamic XML Documents	381
Working with the XML Document	382
Reading from an XML Document	382
Writing to an XML Document	384
Lambda Expressions in Visual Basic	385
Summary	387
CHAPTER 10: ADO.NET AND LINQ	389
<hr/>	
ADO.NET Architecture	390
Basic ADO.NET Features	391
Common ADO.NET Tasks	391
Basic ADO.NET Namespaces and Classes	395
ADO.NET Components	396
.NET Data Providers	398
Connection Object	398
Command Object	399
Using Stored Procedures with Command Objects	399
DataReader Object	402
Executing Commands Asynchronously	404
DataAdapter Objects	406
SQL Server .NET Data Provider	409
OLE DB .NET Data Provider	409
The DataSet Component	410
DataTableCollection	410
DataRelationCollection	410
ExtendedProperties	411
Creating and Using DataSet Objects	411
ADO.NET DataTable Objects	413
Advanced ADO.NET Features of the DataSet and DataTable Objects	414
Working with the Common Provider Model	416
Connection Pooling in ADO.NET	418
Transactions and System.Transactions	418
Creating Transactions	419
Creating Resource Managers	421
LINQ to SQL	421
LINQ to SQL and Visual Basic	422
Retrieving Data Using LINQ to SQL: Creating the Console Application	422
Introducing the O/R Designer	423
Creating the Product Object	424

How Objects Map to LINQ Objects	425
The DataContext Object	426
The Table(TEntity) Object	428
Querying the Database	428
Using Query Expressions	429
Query Expressions in Detail	429
Filtering Using Expressions	429
Performing Joins	430
Grouping Items	431
Stored Procedures	432
Updating the Database	433
Summary	435
CHAPTER 11: DATA ACCESS WITH THE ENTITY FRAMEWORK	437
<hr/>	
Object-Relational Mapping	438
Entity Framework Architecture	438
Conceptual Model	439
Storage Model	442
Mapping Model	443
LINQ to Entities	443
TheObjectContext	445
Mapping Objects to Entities	446
Simple Mapping	446
Using a Single Table for Multiple Objects	448
Using Multiple Tables for an Object	450
Generating the Database from a Model	452
Updating the Model	454
Summary	456
CHAPTER 12: WORKING WITH SQL SERVER	457
<hr/>	
SQL Server Compact	458
Connecting to a SQL Server Compact Database	459
Synchronizing Data	462
SQL Server's Built-in XML Features	468
CLR Integration In SQL Server	470
Deciding between T-SQL and Visual Basic	470
Creating User-Defined Types	471
Creating Stored Procedures	483
Exposing Web Services from SQL Server	489
SQL Server 2008 Features	494

WCF Data Services	495
REST	495
Atom and JSON	495
Exposing Data Using WCF Data Services	497
WCF Data Services Client Library	501
Summary	505
CHAPTER 13: SERVICES (XML/WCF)	507
Introduction to Services	508
The Network Angle	508
Application Development	508
Merging the Network and Application Development	508
The Foundations of Web Services	509
The Problems	510
Some Other Players	511
Web Services	511
What Makes a WCF Service	512
The Larger Move to SOA	513
Capabilities of WCF	514
Contracts and Metadata	514
Working with the WS-* Protocols	515
Building a WCF Service	516
Building a WCF Consumer	523
Adding a Service Reference	523
Reviewing the Reference	525
Configuration File Changes	528
Writing the Consumption Code	529
Working with Data Contracts	531
Building a Service with a Data Contract	532
Namespaces	533
Building the Host	533
Building the Consumer	534
Looking at WSDL and the Schema for HelloCustomerService	536
Summary	538
PART III: SMART CLIENT APPLICATIONS	
CHAPTER 14: WINDOWS FORMS	541
The System.Windows.Forms Namespace	541
Using Forms	542
Setting a Startup Form	542

Showing Forms via Sub Main	543
More about the Application Class	543
Startup Location for a Form	543
Form Borders	544
Always on Top — the TopMost Property	544
Owned Forms	544
Making Forms Transparent and Translucent	545
Visual Inheritance	547
Scrollable Forms	547
MDI Forms	547
An MDI Example in VB 2010	548
Dialog Forms	549
Forms at Runtime	550
Default Instances of Forms	551
Controls	552
Control Tab Order	552
Properties for All Controls	552
Dynamic Sizing and Positioning of Controls	553
FlowLayoutPanel Control	555
TableLayoutPanel Control	556
Panel and GroupBox Container Controls	556
Extender Providers	557
Advanced Capabilities for Data Entry	559
Validating Data Entry	561
Toolbars and the ToolStrip Control	562
Menus	564
Common Dialogs	566
Drag and Drop	568
Summary of Standard Windows.Forms Controls	569
Handling Groups of Related Controls	571
Adding Controls at Runtime	572
Other Handy Programming Tips	573
Summary	573
CHAPTER 15: ADVANCED WINDOWS FORMS	575
<hr/>	
Packaging Logic in Visual Controls	575
Custom Controls in Windows Forms	576
Inheriting from an Existing Control	576
Building a Composite Control	576
Writing a Control from Scratch	577

Inheriting from an Existing Control	577
Process Overview	577
Writing Code for an Inherited Control	578
Other Useful Attributes	581
Defining a Custom Event for the Inherited Control	581
A CheckedListBox Limiting Selected Items	582
The Control and UserControl Base Classes	584
The Control Class	585
The UserControl Class	585
A Composite UserControl	586
Creating a Composite UserControl	586
Resizing the Control	587
Exposing Properties of Contained Controls	587
Stepping through the Example	588
Building a Control from Scratch	591
Painting a Custom Control with GDI+	591
Attaching an Icon for the Toolbox	595
Embedding Controls in Other Controls	595
Summary	597
CHAPTER 16: USER CONTROLS COMBINING WPF AND WINDOWS FORMS	599
<hr/>	
The Integration Library	600
Hosting WPF Controls in Windows Forms	601
Creating a WPF Control Library	602
The Windows Forms Application	604
Hosting Windows Forms Controls in WPF	610
Integration Limitations	614
Summary	615
CHAPTER 17: WPF DESKTOP APPLICATIONS	617
<hr/>	
What, Where, Why, How — WPF Strategy	618
Raster Graphics and Vector Graphics	619
Should Your Next Windows Project Use WPF?	619
Creating a WPF Application	620
Implementing a Custom WPF Application	621
Customizing the User Interface	633
Customizing the Buttons	641
Summary	666

CHAPTER 18: EXPRESSION BLEND 3	667
Getting to Know Blend	668
Creating a New Project	668
SketchFlow	674
Your First SketchFlow	674
SketchFlow Player	676
Documenting Your SketchFlow	678
Summary	678
CHAPTER 19: SILVERLIGHT	679
What Is Silverlight?	679
Smooth Streaming	680
Industry Standard Video	680
Digital Rights Management	680
Starting a Silverlight Project	680
Silverlight Application	681
Silverlight Navigation Application	681
Silverlight Class Library	682
Silverlight Solution	682
Web Application	682
Application Library Caching	682
Silverlight Application	683
Controls	685
Layout Management	686
Adding Items to the Silverlight Project	692
Silverlight User Control	693
Silverlight Application Class	693
Silverlight Page	693
Silverlight Child Window	694
Silverlight Template Control	694
Silverlight Resource Dictionary	694
Silverlight Out of the Browser	694
Summary	695
PART IV: INTERNET APPLICATIONS	
CHAPTER 20: SILVERLIGHT AND SERVICES	699
Services and Silverlight	699
ASMX Web Service	700
WCF Service	702

ADO.NET Data Service	705
Model-View-ViewModel	714
Separation of Concerns	714
The Model	714
The View	717
The ViewModel	717
Summary	718
CHAPTER 21: WORKING WITH ASP.NET	719
<hr/>	
The History of ASP.NET	719
Key Features of ASP.NET	720
Developer Productivity	720
Performance and Scalability	720
Localization	721
Health Monitoring	721
Easy Access to Data	721
Administration and Management	721
Visual Studio Support for ASP.NET	721
Web Site and Web Application Projects	722
ASP.NET Application Folders	722
Web Server Options	723
Building ASP.NET Applications Using Web Forms	723
Pages, Forms, Controls, and Events	724
Data-Driven Applications	735
Data Binding with the SqlDataSource Control	735
Data Binding with the LinqDataSource Control	743
Data Binding with the ObjectDataSource Control	746
Summary	749
CHAPTER 22: ASP.NET ADVANCED FEATURES	751
<hr/>	
Master Pages	751
Creating a Master Page	752
Creating the Content Page	755
Providing Default Content in Your Master Page	758
Navigation	758
Using the SiteMapPath Server Control	759
Menu Server Control	760
Working with the ASP.NET Provider Model	761
Creating an Application Services Database	762
Membership and Role Management	766

Profile Properties	771
Microsoft Ajax (ASP.NET AJAX)	772
Understanding the Need for Ajax	773
Microsoft Ajax Implementation	773
UpdatePanel Control vs. Client-Side Service Calls	775
Introducing the Sample Project	775
Adding the UpdatePanel Control	778
Using Client-Side Service Calls and Client Templates	780
Summary	785
CHAPTER 23: ASP.NET MVC	787
<hr/>	
Model-View-Controller and ASP.NET	788
Building an ASP.NET MVC Application	788
Creating the Project	788
Controllers and Actions	789
Adding the Model	792
Views	793
Routing	796
Scaffolding and CRUD Operations	797
Validation	804
Summary	806
CHAPTER 24: SHAREPOINT 2010 DEVELOPMENT	807
<hr/>	
Introduction	807
SharePoint Foundation 2010	808
SharePoint Server 2010	808
SharePoint Terminology	808
The SharePoint Development Environment	809
Features and the Solutions Framework	809
Features	809
Solution Framework	817
Visual Studio Tools for SharePoint Development	821
The SharePoint 2010 Object Models	827
Server Object Model	828
Client Object Models	831
Building Web Parts	833
Summary	839

PART V: LIBRARIES AND SPECIALIZED TOPICS

CHAPTER 25: VISUAL STUDIO TOOLS FOR OFFICE	843
Examining the VSTO Releases	844
Office Automation versus VSTO	844
PIA-Free Deployment	844
VSTO Project Types	845
Office Business Application Architecture	846
Working with Both VBA and VSTO	847
Creating a Document Template (Word)	852
Adding Content to the Document	854
Adding a Ribbon and an Actions Pane	856
Activating the Actions Pane	859
Updating a Content Control	862
Creating an Office Add-In (Excel)	864
Outlook Form Regions	871
Summary	880
CHAPTER 26: WINDOWS WORKFLOW FOUNDATION	881
Workflow in Applications	881
Building Workflows	882
Adding Workflow with Windows Workflow Foundation	882
A Simple Workflow	884
Standard Activities	887
A Less Simple Workflow	889
Building Custom Activities	896
Dynamically Loading Workflows	899
Rehosting the Workflow Designer	900
Summary	903
CHAPTER 27: LOCALIZATION	905
Cultures and Regions	905
Understanding Culture Types	906
Looking at Your Thread	907
Declaring Culture Globally in ASP.NET	908
Adopting Culture Settings in ASP.NET	909
Translating Values and Behaviors	910
Understanding Differences in Dates	910
Differences in Numbers and Currencies	913
Understanding Differences in Sorting	915

ASP.NET Resource Files	916
Making Use of Local Resources	916
Global Resources	921
Resource Files in Windows Forms	923
Summary	927
CHAPTER 28: COM-INTEROP	929
<hr/>	
Understanding COM	930
COM and .NET in Practice	931
A Legacy Component	931
The .NET Application	932
Trying It All Out	935
Using TlbImp Directly	935
Late Binding	936
ActiveX Controls	940
The Legacy ActiveX Control	940
A .NET Application, Again	941
Trying It All Out, Again	944
Using .NET Components in the COM World	944
A .NET Component	944
RegAsm	946
TlbExp	947
P/Invoke	947
Windows API Code Pack	948
Summary	948
CHAPTER 29: NETWORK PROGRAMMING	949
<hr/>	
Protocols, Addresses, and Ports	949
Addresses and Names	951
Ports: They're Not Just for Ships	952
Firewalls: Can't Live with Them, Can't Live without Them	952
The System.Net Namespace	953
Web Requests (and Responses)	953
Simplifying Common Web Requests with WebClient	958
Sockets	960
Building the Application	960
Creating Conversation Windows	962
Sending Messages	969
Shutting Down the Application	973

Using Internet Explorer in Your Applications	976
Windows Forms and HTML — No Problem!	976
Summary	979
CHAPTER 30: APPLICATION SERVICES	981
<hr/>	
Using IIS for Application Services	981
Windows Services	982
Characteristics of a Windows Service	982
Interacting with Windows Services	983
Creating a Windows Service	984
The .NET Framework Classes for Windows Services	984
Other Types of Windows Services	987
Creating a Windows Service in Visual Basic	987
Creating a File Watcher Service	988
Creating a Solution for the Windows Service	988
Adding .NET Components to the Service	989
Installing the Service	992
Starting the Service	992
Uninstalling the Service	993
Communicating with the Service	994
The ServiceController Class	994
Integrating a ServiceController into the Example	995
More about ServiceController	996
Custom Commands	997
Passing Strings to a Service	998
Debugging the Service	998
Summary	1000
CHAPTER 31: ASSEMBLIES AND REFLECTION	1001
<hr/>	
Assemblies	1002
The Manifest	1002
Assembly Identity	1004
Referenced Assemblies	1006
Assemblies and Deployment	1006
Application-Private Assemblies	1006
Shared Assemblies	1007
Versioning Issues	1008
Application Isolation	1008

Side-By-Side Execution	1009
Self-Describing Components	1009
Version Policies	1009
Configuration Files	1010
Basics of Reflection	1013
The Assembly Class	1014
Getting Currently Loaded Assemblies	1014
The Type Class	1015
Dynamic Loading of Assemblies	1016
The LoadFrom Method of the Assembly Class	1016
Dynamic Loading Example	1017
Putting Assemblies to Work	1018
Summary	1019
CHAPTER 32: SECURITY IN THE .NET FRAMEWORK	1021
<hr/>	
Security Concepts and Definitions	1022
Permissions in the System.Security.Permissions Namespace	1023
Code Access Permissions	1026
Identity Permissions	1026
Role-Based Permissions	1027
Managing Code Access Permission Sets	1029
User Access Control	1032
Defining Your Application UAC Settings	1033
Security Tools	1034
Exceptions Using the SecurityException Class	1035
Encryption Basics	1036
Hash Algorithms	1037
Summary	1049
CHAPTER 33: PARALLEL PROGRAMMING USING TASKS AND THREADS	1051
<hr/>	
Launching Parallel Tasks	1051
System.Threading.Tasks.Parallel Class	1052
Parallel.Invoke	1052
Transforming Sequential Code to Parallel Code	1057
Detecting Hotspots	1057
Measuring Speedups Achieved by Parallel Execution	1060
Understanding Parallel and Concurrent Execution	1061
Parallelizing Loops	1062

Parallel.For	1062
Parallel.ForEach	1067
Exiting from Parallel Loops	1072
Specifying the Desired Degree of Parallelism	1076
ParallelOptions	1077
Understanding Hardware Threads and Logical Cores	1078
Creating and Managing Tasks	1079
System.Threading.Tasks.Task	1080
Understanding a Task's Life Cycle	1081
Using Tasks to Parallelize Code	1082
Returning Values from Tasks	1090
Preparing the Code for Concurrency and Parallelism	1093
Understanding Concurrent Collection Features	1094
Transforming LINQ into PLINQ	1097
Summary	1099
CHAPTER 34: DEPLOYMENT	1101
Application Deployment	1102
Why Deployment Is Straightforward in .NET	1102
XCOPY Deployment	1102
Using the Windows Installer	1102
ClickOnce Deployment	1103
Choosing a Framework Version	1103
Visual Studio Deployment Projects	1103
Project Templates	1104
Creating a Deployment Project	1105
Modifying the Deployment Project	1109
Project Properties	1109
The File System Editor	1111
The Registry Editor	1115
The File Types Editor	1117
The User Interface Editor	1118
The Custom Actions Editor	1120
The Launch Conditions Editor	1122
Building	1124
Internet Deployment of Windows Applications	1124
No-Touch Deployment	1125
ClickOnce Deployment	1126
IIS Web Deployment Tool	1133
Summary	1135

APPENDIX A: THE VISUAL BASIC COMPILER	1137
APPENDIX B: VISUAL BASIC POWER PACKS TOOLS	1151
APPENDIX C: WORKFLOW 2008 SPECIFICS	1165
APPENDIX D: ENTERPRISE SERVICES	1185
APPENDIX E: PROGRAMMING FOR THE CLOUD	1205
<i>INDEX</i>	1233