

Secrets of the Visual C++ Masters

掌握 Visual C++ 的奥秘

Namir Clement Shammas

清华大学出版社



Prentice-Hall



Secrets of the Visual C++TM Masters

掌握 Visual C++ 的奥秘

Namir Clement Shammas

清 华 大 学 出 版 社
Prentice-Hall International Inc.

(京)新登字 158 号

内容提要

这是本帮助程序设计人员从 Visual C++ 获取最大效益的书。书内探讨抽象类、元形类及其它特殊类设计,阐释类分层设计问题,包括特许实例和启动成员函数的公开访问,并用众多例子阐释和澄清具有相当难度的课题。全书共分十二章,包括:特殊类设计和对象行为;类分层设计;使用通用的 MFC 类;建立运用 TEMPLDEF 实用程序的模板文件;对话框数据传输;公共对话;类异常;管理内存;虚拟内存;基本图形;绘线;绘形。本书配有磁盘,内含对话框数据传输, MFC 异常类,虚拟内存功能,重载 new, delete, 和一。读者通过本书将学到 MFC 2.0 的秘要,解开运行期资源操作的奥秘,发现有效管理内存的鲜为人知的方法。

本书适用于计算机专业师生及程序设计人员。

©清华大学出版社/Prentice Hall Inc. 1994

版权所有。

本书任何部分之文字,未经出版者书面同意,不得用任何方式抄袭、节录及翻印。

Original edition published by Sams Publishing. Copyright © 1993. This reprint jointly published by Tsinghua University Press/Prentice Hall. This edition is authorized for sale in mainland China only.

中国〔大陆〕版

Secrets of the Visual C++™ Masters

掌握 Visual C++ 的奥秘

Namir Clement Shammas

清华大学出版社 出版
Prentice-Hall Inc.

北京 清华园

清华大学印刷厂印刷
新华书店总店科技发行所发行

开本:787×1092 1/16 印张:53
1994 年 5 月第 1 版 1994 年 5 月第 1 次印刷
印数:0001—1000
ISBN 7-302-01506-6/TP·610
定价:108.00 元

<i>Topic</i>	<i>Chapter</i>	<i>Topic</i>	<i>Chapter</i>
Abstract classes	1	The list classes	3
Array classes	3	The map classes	3
Basics of virtual memory functions	9	Memory allocation functions	8
C++ exceptions	7	Memory deallocation functions	8
The <code>CColorDialog</code> class	6	Memory expansion and reallocation functions	8
<code>CDataExchange</code> transfer in a complex modal dialog box	5	Memory information query functions	8
<code>CDataExchange</code> transfer of a list box	5	Memory verification functions	8
The <code>CDC</code> class	10	Metamorphic classes	1
The <code>CFileDialog</code> class	6	The <code>new</code> operator and different memory models	8
The <code>CFindReplace</code> class	6	Overloading the <code>-></code> operator	8
The <code>CPrintDialog</code> class	6	Overloading the <code>delete</code> operator	8
Creating the queue of <code>it</code> class	4	Overloading the <code>new</code> operator	8
Creating the queue of <code>String</code> class	4	Privileged instances	2
The <code>CString</code> class	3	Remapping logical coordinates	11
Data transfer in complex modal dialog box	5	The smarter line-drawing program	11
Data transfer with the MFC class <code>CDataExchange</code>	5	State-engine objects	1
Deferred binding and rebinding	1	Toggling public access of member functions	2
Disabled objects	1	Transfer in a simple modal dialog box	5
Drawing a filled curve with simple lines	11	Transfer in a simple modeless dialog box	5
Drawing various shapes	12	Using the <code>COBList</code> class	4
Drawing with different line styles	11	Using the <code>TEMPLDEF</code> utility	4
Extendible structures	1	The various kinds of pointers	8
Extending the <code>CString</code> class	3	The various memory models	8
Freehand curve drawing	11	The virtual array class	9
The generic queue class	4	The virtual list class	9
The graphical drawing classes	10	The Visual C++ exceptions	7

ABOUT THE AUTHOR

Namir Clement Shamma is the author of *Object-Oriented Programming with Borland Pascal 7*, *Windows Programmer's Guide to ObjectWindows Library*, and *Windows Programmer's Guide to Microsoft Foundation Class Library* (all published by Sams Publishing).

INTRODUCTION

Developing well-crafted, user-friendly Windows applications is far more complex than writing similar MS-DOS applications. One factor is the immense amount of information a programmer needs to master; a programmer faces many how-to questions. This book looks at various issues related to programming in C++ in general, as well as Visual C++ in particular. The book contains 12 chapters that cover a wide range of topics, including exceptions, memory management, graphics, and class design.

This book is aimed at Visual C++ programmers with at least average programming skills. The book assumes that you are reasonably familiar with using Visual C++ and using the classes in the Microsoft Foundation Class (MFC) hierarchy. In other words, you should know how to write Windows programs that use menus and visual controls, and you should be able to handle the various Windows messages emitted by different menu selections and visual controls.

I wrote this book as a collection of modules. These modules are between one and three chapters long. You can read the chapters in any module order. For example, you can start with Chapters 10, 11, and 12 if you want to learn about GDI classes in MFC 2.0. Or you can start by reading Chapters 8 and 9 to learn about memory management libraries. The chapters cover advanced aspects of programming with C++ and MFC 2.0. Some chapters focus on important nonvisual MFC classes that offer vital programming features.

Chapter 1 discusses issues regarding special class design and object behavior. Class design issues include abstract classes, metamorphic classes, extendible structures, and deferred binding and rebinding. Object behavior issues include state-engine objects and disabled objects.

Chapter 2 looks at some of the issues involved in designing a class hierarchy and illustrates three ways to design a class hierarchy.

Chapter 3 focuses on the general-purpose MFC classes `CString`, the array classes, the list classes, and the map classes. These classes provide support to popular data structures.

Chapter 4 examines the `TEMPLDEF` utility, which is used to expand template files. This utility enables you to write template libraries and then expand them. This chapter illustrates how to create queue classes for the `int` type and `CString` class. It also compares the expanded template classes with similar ones created using the class `CObList`.

Chapter 5 discusses the techniques involved in transferring data to and from the controls of a dialog box. It shows you how to develop your own data transfer classes and also how to use the MFC class `CDataExchange`. It also offers examples of simple and advanced dialog boxes.

Chapter 6 presents the MFC classes that model the common dialog boxes. These dialog boxes include the file selection dialog box, the font selection dialog box, the color selection dialog box, the print dialog box, and the text search/replace dialog box.

Chapter 7 deals with exceptions in C++. It first presents the proposed mechanism for C++ in general, then it discusses the exception mechanisms in Visual C++ and discusses the MFC classes that support various kinds of exceptions, such as file and memory exceptions.

Chapter 8 looks at the memory-management functions offered by the C runtime library. These functions work for the various kinds of programs produced by Visual C++. This chapter looks at the functions that allocate, reallocate, expand, query, verify, and remove dynamic memory blocks. It also looks at the C++ operators `new` and `delete` and discusses how to use them with different memory models. In addition, this chapter discusses how to overload the operators `new`, `delete`, and `->`.

Chapter 9 examines the runtime library functions that support virtual memory for MS-DOS programs. These functions enable you to use extended memory, expanded memory, and disk space for auxiliary storage. This chapter also illustrates how to create and use classes that model virtual arrays and lists.

Chapter 10 presents background information for using the various MFC graphical classes. It looks at the various Graphical Drawing Object classes and the Graphical Drawing classes. It also focuses on a selection of the member functions in the versatile `CDC` class.

Chapter 11 presents examples for drawing various kinds of lines. The examples range from ones that draw unfilled and filled curves to ones that support the freehand drawing of lines. This chapter also shows you how to manage freehand lines when repainting the window.

Chapter 12 offers examples for drawing rectangles and ellipses. The examples show how to draw rectangles filled with hatched patterns. You also learn about freehand drawing of rectangles and ellipses, as well as how to manage the various drawing parameters for these shapes.

I hope this book assists you in opening new doors in programming with Visual C++. I also hope that the information in this book proves to be a valuable time-saver. Happy programming!

OVERVIEW

INTRODUCTION	XIX
1 SPECIAL CLASS DESIGN AND OBJECT BEHAVIOR	1
2 CLASS HIERARCHY DESIGN	83
3 USING GENERAL-PURPOSE MFC CLASSES	139
4 CREATING TEMPLATE FILES USING THE TEMPLDEF UTILITY	209
5 DIALOG BOX DATA TRANSFER	271
6 COMMON DIALOGS	339
7 EXCEPTIONS	387
8 MANAGING MEMORY	461
9 VIRTUAL MEMORY	539
10 BASIC GRAPHICS	587
11 DRAWING LINES	631
12 DRAWING SHAPES	711
INDEX	781

CONTENTS

INTRODUCTION	XIX
1 SPECIAL CLASS DESIGN AND OBJECT BEHAVIOR	1
Abstract Classes	2
Basic Rules for Abstract Classes	2
Abstract Classes as Base Classes	3
Abstract Objects in Sub-Hierarchies	12
The cArray Class	13
The cAbsSortArray Class	15
The cSortArray Class	15
The cNocaseSortArray Class	15
Metamorphic Classes	24
Array-Queue-Stack Example	25
The cStrArray Class	27
The cStrFixedQue Class	28
The cStrFixedStack Class	29
Test Program	34
Extendible Structures	39
Simulating Extendible Structures	39
Extendible Structures in a Class Hierarchy	47
State-Engine Objects	55
Disabled Objects	61
Deferred Binding and Rebinding	65
Extendible Records in Oberon	66
Emulating Member Functions in Oberon	67
Emulating the Oberon Solution	67
Array Example	68
Summary	79
2 CLASS HIERARCHY DESIGN	83
Privileged Instances	84
The cUArray Class	85
The cFlexUArray Class	87

The CArray_10 Class	87
The CFlexUArray_10 Class	88
The COArray Class	88
The CFlexOArray Class	89
The COArray_10 Class	89
The CFlexOArray_10 Class	89
Testing Class CArray	99
Testing Class CArray_10	100
Testing Class CFlexUArray	100
Testing Class CFlexUArray_10	101
Testing the Ordered-Array Classes	102
Using Privileged Instances	108
Toggling Public Access of Member Functions	122
The CArray Class	122
The CFlexUArray Class	123
The CArray_10 Class	123
The CFlexUArray_10 Class	123
The COArray Class	124
The CFlexOArray Class	124
The COArray_10 Class	124
The CFlexOArray_10 Class	124
Testing the CArray Class Hierarchy	133
Summary	138
3 USING GENERAL-PURPOSE MFC CLASSES	139
The CString Class	140
Constructors	142
Attribute Functions	143
Access Functions	143
Assignment Operators	145
Concatenation Operators	145
String Comparison Functions	146
String Extraction Functions	147
Character Conversion Functions	148
Search Functions	148
The CString1.EXE Test Program	149
Extending the CString Class	159
The array Classes	160
The CStringArray Class	162

Extending Class <code>cStringArray</code>	164
The Other array Classes	164
The <code>CSTRARR1.EXE</code> Test Program	164
The list Classes	174
The <code>cStringList</code> Class	174
The <code>CSTRLST1.EXE</code> Test Program	179
Extending the Class <code>cobList</code>	189
The map Classes	191
The <code>cMapStringToString</code> Class	192
The <code>CSTRMAP1.EXE</code> Test Program	195
Summary	208
4 CREATING TEMPLATE FILES USING THE <code>TEMPLDEF</code> UTILITY	209
Using the <code>TEMPLDEF</code> Utility	210
The Generic Queue Class	211
Creating the Queue of <code>int</code> Class	220
The <code>MAKETMPL.BAT</code> Batch File	220
The <code>INT.HPP</code> Header File	221
The <code>INT.CPP</code> File	223
The <code>INTQUEUE.EXE</code> Test Program	229
Creating the Queue of <code>string</code> Class	239
The <code>STRING.HPP</code> File	239
The <code>STRING.CPP</code> File	241
The <code>STRQUEUE.EXE</code> Test Program	247
Using the <code>cobList</code> Class	257
Declaring the <code>cobdb1Queue</code> Class	257
The <code>CSTRQUEUE.EXE</code> Test Program	258
Summary	269
5 DIALOG BOX DATA TRANSFER	271
Custom Data Transfer Classes	272
Data Transfer in a Simple Modal Dialog Box	275
Data Transfer in a Simple Modeless Dialog Box	283
Data Transfer in a Complex Modal Dialog Box	295
Data Transfer with the MFC Class <code>CDataExchange</code>	305
The Basics	305
Data Transfer Mechanisms	310
The <code>CDataExchange</code> Class	311
<code>CDataExchange</code> Transfer in a Simple Modal Dialog Box	312

	<code>CDataExchange</code> Transfer in a Complex Modal Dialog Box	320
	<code>CDataExchange</code> Transfer of a List Box	330
	Summary	338
6	COMMON DIALOGS	339
	Software Requirements	340
	The <code>CFileDialog</code> Class	340
	The Supporting Classes and Structures	341
	Invoking the File Dialog Box	344
	The Helper Functions	345
	A Revised File Statistics Program	345
	The <code>CFontDialog</code> Class	349
	Supporting Classes and Structures	350
	The Helper Functions	353
	A Sample Program	353
	The <code>CColorDialog</code> Class	357
	Supporting Classes and Structures	358
	The Helper Functions	360
	A Sample Program	360
	The <code>CPrintDialog</code> Class	363
	Supporting Classes and Structures	364
	The Helper Functions	367
	A Sample Program	368
	The <code>CFindReplace</code> Class	373
	Supporting Classes and Structures	375
	Notifying the Parent Window	377
	The Helper Functions	378
	A Sample Program	379
	Summary	385
7	EXCEPTIONS	387
	C++ Exceptions	388
	Discrimination of Exceptions	390
	The Naming of Exceptions	391
	Exceptions and Non-Error Code Jumps	392
	Unhandled Exceptions	392
	Alternatives to Exception Handling	392
	Visual C++ Exceptions	393
	The Visual C++ Exception Syntax	393

The MFC Exception Classes	395
Generating Exceptions	395
The Class CException	395
The Class CMemoryException	396
The MEMERR1.EXE Test Program	397
The MEMERR2.EXE Test Program	402
The Class CFileException	408
The FILEERR1.EXE Test Program	412
The Class CArchiveException	421
The ARCHERR1.EXE Test Program	424
The Class CResourceException	434
The RESERR1.EXE Test Program	434
The Class CUserException	444
The USERERR1.EXE Test Program	444
The Class CNotSupportedException	452
The Class COleException	453
Summary	457
8 MANAGING MEMORY	461
The Various Memory Models	462
The Various Kinds of Pointers	463
Memory Management Functions	463
Memory Allocation Functions	464
The _alloca Function	464
The _bheapseg Function	467
The malloc Functions	471
The calloc Functions	475
The _halloc Function	479
Memory Deallocation Functions	481
The _bfreeseg Function	482
The free Functions	482
The _hfree Function	482
The heapmin Functions	483
Memory Expansion and Reallocation Functions	488
The heapadd Functions	488
The expand Functions	493
The realloc Functions	501
Memory Information Query Functions	509
The _freect Function	509

The <code>heapwalk</code> Functions	510
The <code>_memavi</code> Function	511
The <code>_memmax</code> Function	511
The <code>msize</code> Functions	511
The <code>_stackavail</code> Function	518
Memory Verification Functions	518
The <code>heapchk</code> Functions	518
The <code>heapset</code> Functions	519
The Operator <code>new</code> and Different Memory Models	519
The <code>set_new_handler</code> Functions	521
Overloading the Operator <code>new</code>	521
Overloading the Operator <code>delete</code>	523
Uses for Overloading <code>new</code> and <code>delete</code>	523
The <code>NEWDEL1.EXE</code> Example	524
The <code>NEWDEL2.EXE</code> Example	527
The <code>NEWDEL3.EXE</code> Example	530
Overloading the Operator <code>-></code>	534
Summary	536
9 VIRTUAL MEMORY	539
The Basics of Virtual Memory Functions	540
The <code>_vheapinit</code> Function	541
The <code>_vmalloc</code> Function	542
The <code>_vrealloc</code> Function	542
The <code>_vmsize</code> Function	543
The <code>_vload</code> Function	544
The <code>_vlock</code> Function	546
The <code>_vlockcnt</code> Function	546
The <code>_vunlock</code> Function	546
The <code>_vheapterm</code> Function	547
The <code>_vfree</code> Function	547
The Virtual Array Class	548
The <code>cvmArray</code> Class	549
The <code>TSARRAY.EXE</code> Test Program	561
The Virtual List Class	566
The <code>cvmDbllist</code> Class	566
The <code>TSLIST.EXE</code> Test Program	579
Summary	584

10	BASIC GRAPHICS	587
	The Graphical Drawing Objects Classes	588
	The Class <code>CGdiObject</code>	588
	The Class <code>CPen</code>	589
	The Class <code>CBrush</code>	591
	The Class <code>CFont</code>	593
	The Class <code>CBitmap</code>	597
	The Class <code>CPalette</code>	598
	The Class <code>CRgn</code>	598
	The Graphical Drawing Classes	599
	The Class <code>CDC</code>	600
	The Class <code>CPaintDC</code>	605
	The Class <code>CClientDC</code>	606
	The Class <code>CWindowDC</code>	606
	Graphic Attributes of the <code>CDC</code> Class	607
	Selecting Objects	607
	Drawing Lines	610
	Drawing Shapes	614
	Drawing Attributes	621
	Mapping Coordinates	627
	Region Manipulation	629
	Summary	630
11	DRAWING LINES	631
	Drawing Curves with Simple Lines	632
	Drawing a Filled Curve with Simple Lines	641
	Remapping Logical Coordinates	649
	Drawing with Different Line Styles	657
	Freehand Curve Drawing	672
	Smart Freehand Curve Drawing	677
	Simple Freehand Line Drawing	685
	The Smarter Line-Drawing Program	692
	Rubber-Band Line Drawing	700
	Summary	709
12	DRAWING SHAPES	711
	Drawing Hatched Rectangles	711
	Drawing Simple Rectangles	720
	Drawing Filled and Colored Rectangles	731

Drawing Various Shapes	759
Summary	779
INDEX	781

SPECIAL CLASS DESIGN AND OBJECT BEHAVIOR

This chapter looks at special object behavior and how that behavior affects the design of individual classes and class hierarchies. You will learn about the following kinds of classes and behaviors:

- Abstract classes
- Metamorphic classes
- Extendible structures
- Disciplined classes
- Disabled classes
- Deferred binding and rebinding

Abstract classes
Metamorphic classes
Extendible structures
State-engine objects
Disabled objects
*Deferred binding and
rebinding*