

Programming Sound for DOS and Windows

Nathan Gurewich &
Ori Gurewich

DOS 和 Windows 的声音程序设计

清华大学出版社



Prentice-Hall



17316
4751

378148

Programming Sound for DOS and Windows

DOS 和 Windows 的声音程序设计

李 强
Nathan Gurewich
Ori Gurewich

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

(京)新登字 158 号

39169 62
内 容 提 要

通过本书可使 PC 机说话或播放音乐而不需增加硬件,即建立含真实话音与音乐的 DOS 和 Windows 应用程序,建立与声音同步的文字和图形,藉助声卡建立用户声音,包括本人自己的话音。书中有一百余幅插图说明声音如何产生。全书主要内容为:声音程序设计;声音编程技术和声音库;Generic 1 Windows 程序;Hello, C 程序;声音文件类型;动画制作;文字移动与说话同步技术;控制;基于 Generic 2 的程序——多任务处理;Stand-Alone 程序;在 Windows 应用程序中使用声卡;DOS 下的 C 语言声音程序设计;DOS 下的声音增强卡。本书配有磁盘,盘内有本书所用各程序的源代码,C 库及有用的声音实用程序。

本书适用于计算机专业人员,PC 机用户。

©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

Programming sound

for DOS and Windows

DOS 和 Windows 的声音程序设计

Nathan Gurewicz/Ori Gurewicz

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:35
1994 年 5 月第 1 版 1994 年 5 月第 1 次印刷
印数:0001—1000
ISBN 7-302-01512-0/TP·612
定价:74.00 元

Overview

Chapter 1	Sound Programming	1
Chapter 2	Sound Programming Techniques and Sound Libraries	9
Chapter 3	The Generic1 Windows Program	23
Chapter 4	The Hello.c Program	55
Chapter 5	Sound File Types	111
Chapter 6	Animation	139
Chapter 7	Synchronizing Moving Text with Speech	221
Chapter 8	Controls	243
Chapter 9	Generic2-Based Programs—Multitasking	307
Chapter 10	Stand-Alone Programs	369

Chapter 11	Using a Sound Card from Within a Windows Application	389
Chapter 12	Sound C Programming for DOS	465
Chapter 13	The Sound Blaster Card Under DOS	497
Appendix	Sound DLL	509
	Index	513

Contents

Chapter 1	Sound Programming	1
	The Concept of the PC Speaking and Playing Music	2
	Programs that Appeal to the Human Senses	3
	The Concept of the PC Speaking With and Without Additional Hardware	3
	Installing this Book's Disk	5
	The TSEngine	5
	This Book's Disk	5
	Installing this Book's Disk	6
Chapter 2	Sound Programing Techniques and Sound Libraries	9
	How To Make the PC Play Sound	10
	How To Best Utilize Sound from Within Your Programs	11
	The Windows Operating System	11
	Creating New Icon Groups in the Program Manager	11
	Executing the Applications	18
	How This Book Is Organized	19
	Sound Programs for DOS	20
Chapter 3	The Generic1 Windows Program	23
	Generic1.c and Generic2.c	24
	The Generic1.c Program Files	25
	A Quick Review of Generic1	33
	The <i>#include</i> Section of Generic1.c	34
	The <i>WinMain()</i> Function of Generic1.c	35
	The Local Variables of <i>WinMain()</i>	35
	Globalizing the Instance of Generic1	35

Updating and Registering the Window Class	36
Create, Update, and Show the Program Window	37
The Message Loop of Generic1.c	37
The <i>WndProc()</i> Function	38
The Message Switch of <i>WndProc()</i>	38
Processing the <i>WM_CREATE</i> Message	39
Processing the <i>WM_PAINT</i> Message	40
Processing the <i>WM_COMMAND</i> Message	41
Processing the <i>WM_DESTROY</i> Message	43
The Resource File, <i>Generic1.rc</i>	43
The Module Definition File, <i>Generic1.def</i>	45
The Make File, <i>Generic1.mak</i> , for the Microsoft Compiler	45
The <i>-c</i> Switch	47
The <i>-G2sw</i> Switch	47
The <i>-Ow</i> Switch	47
The <i>-W3</i> Switch	47
The <i>-Zp</i> Switch	48
The Linking Section of <i>Generic1.mak</i>	48
The <i>TegoWin.lib</i> Library	50
The <i>NMAKE</i> Program	50
Compiling and Linking with the Microsoft C Compiler	50
Compiling and Linking with the Programmer Working Bench of Microsoft	51
The Make File, <i>Generic1.mak</i> , for the Borland Compiler	51
Executing the <i>Generic1.exe</i> Program	52
Executing <i>Generic1</i> From Within Windows	52
Making an Icon for the Program	52
Executing <i>Generic1</i> From the DOS Command Line	53
Writing <i>Generic1.c</i> -Based Programs	53

Chapter

4

The Hello.c Program 55

Compiling and Linking the Hello Program with the Microsoft Compiler	56
Compiling and Linking the Hello Program with the Borland Compiler	57

Executing the Hello Program	57
The Files of the Hello Program	58
The Make File, Hello.mak	67
The Resource File, Hello.rc	67
The Module Definition File, Hello.def	67
The #include File, Hello.h	68
The Hello.c File	68
DLL Functions Versus the Static <i>sp_</i> Functions	69
Use of Other <i>sp_</i> Functions	70
The Parameters of the <i>sp_OpenSession</i> Function	71
The Hello.ts Sound File	71
The Stand-Alone Parameter	71
The Third Parameter of the <i>sp_OpenSession()</i> Function	72
The File-Type Parameter	72
The <i>sp_PlayF()</i> Function	73
The <i>SP_START_OF_FILE</i> and <i>SP_END_OF_FILE</i> Identifiers	74
Other <i>sp_PlayF()</i> Statements in Hello.c	75
The TS Sound Editor Program	76
Saying Good-Bye Upon Quitting the Program	77
The <i>sp_PlayLabelF()</i> and <i>sp_PlayTimeF()</i> Functions	78
The Sections Program	80
Compiling and Linking the Sections Program	82
Executing the Sections Program	83
The Sound Sections of the Sections Program	83
The Files of the Sections Program	83
The <i>WM_CREATE</i> Case	94
Playing the Entire Sound File	94
Playing Sections From the Sound File	94
The <i>WM_ABOUT</i> Case	95
The <i>WM_DESTROY</i> Case	95
The Push2Say Program	96
Compiling and Linking the Push2Say Program	96
The Files of the Push2Say Program	97
The Push Buttons of the Push2Say Program	108

Chapter			
5	Sound File Types		111
	The FileType Program		112
	Compiling and Linking the FileType Program		113
	Executing the FileType Program		113
	The Files of the FileType Program		114
	Bit-Map Files		129
	Quick Overview of the FileType Program		129
	A Dialog Box as the Main Window		129
	Processing <i>WM_COMMAND</i> Messages		130
	Other Returned Values From <i>sp_OpenSession</i>		133
	Processing Keyboard Messages		134
	The About Dialog Box		135
	The <i>SetFocus()</i> Function		135
	Displaying the Bit Maps		136
	The Background of FileType		138
Chapter			
6	Animation		139
	The Dog Program		140
	Compiling, Linking, and		
	Executing the Dog Program		140
	What Is Animation?		142
	Creating the Bit Maps		143
	The Dog Program Files		144
	Using the Returned Value of <i>sp_PlayF()</i>		160
	The <i>WinMain()</i> of Dog.c		161
	The <i>WndProc()</i> of Dog.c		162
	The <i>BarkingShow()</i> Function		166
	The <i>PlayIt()</i> Function		166
	The <i>DisplayDogWithOpen()</i>		
	and <i>DisplayDogWithClose()</i> Functions		169
	The HearMe Program		169
	The Files of the HearMe Program		169
	Compiling, Linking, and		
	Executing the HearMe Program		170
	Saying Good-Bye and Quitting the Program		188
	Facial Expressions of the HearMe Program		188
	Playing and Animating		189

	The <i>DisplayFaceWithOpen()</i> , <i>DisplayFaceWithClose()</i> , and <i>DisplayFaceWithMid()</i> Functions	192
	Improving the HearMe Program	192
	The Dance Program	193
	Compiling, Linking, and Executing the Dance Program	193
	The Files of the Dance Program	195
	The <i>WndProc()</i> of the Dance Program	214
	The Dance Show	215
	The <i>DanceShow()</i> Function	216
Chapter		
7	Synchronizing Moving Text with Speech	221
	The Press Program	222
	Compiling, Linking, and Executing the Press Program	223
	The Files of the Press Program	224
	The <i>WndProc()</i> Function of <i>Press.c</i>	225
	The <i>PlayInstruction()</i> Function	227
	Programs Similar to Press	229
	The <i>PlzWait</i> Program	230
	Compiling and Linking the <i>PlzWait</i> Program	230
	Executing the <i>PlzWait</i> Program	231
	The Files of the <i>PlzWait</i> Program	233
	The <i>WndProc()</i> of <i>PlzWait</i>	233
	The <i>SpeakShow()</i> Function	236
	The <i>DisplayPlease()</i> Function	239
	Alternative Methods for Implementing the Show	241
	Using Paintbrush	241
	General Suggestions for Creating Shows	242
Chapter		
8	Controls	243
	The Rotate Program	244
	Compiling, Linking, and Executing the Rotate Program	244
	The Rotate Program Files	247
	Opening the Sound Session	264
	Executing the Rotate Dialog Box	265
	Initializing the Rotate Dialog Box	266

Setting the Minimum and Maximum Values of the Speed Scroll Bar	266
Positioning the Speed Scroll Bar at Its Natural Position	267
Saving the Current Position of the Speed Scroll Bar	267
Loading Bit-Map Files	
Used in the Rotate Dialog Box	268
The WM_PAINT Case of the Rotate Dialog Box	268
Incrementing and Decrementing the Speed Scroll Bar	269
Dragging the Speed Scroll Bar	270
The <i>ChangeSpeedWasRequested()</i> Function	270
The <i>sp_SetNewSpeed()</i> Function	270
The PLAY_PB Push	
Button of the Rotate Dialog Box	271
The PLAY_BACKWARD_PB	
Case of the Rotate Dialog Box	272
The <i>sp_PlayB()</i> Function	272
The ROTATERIGHT() and ROTATELEFT() Functions	273
More About the <i>sp_PlayB()</i> Function	275
Exiting From the Rotate Dialog Box	275
The Controls Program	276
Compiling, Linking, and Executing the Controls Program	276
The Files of the Controls Program	279
New <i>sp_</i> Functions in the Controls Program	300
About the Controls Program	302
Displaying the Sound	
File Position During Playback	302
Enabling the User to Stop Playback	304
Enabling the User to Change the Playback Speed During Playback	305
Choosing the Size of the Playback Group	305
 Chapter 9	
Generic2-Based Programs—Multitasking	307
The Windows Operating System Operation	308
The Message Loop of Generic1	308

The Message Loop of Generic2	310
The Generic2 Program	311
Compiling and Linking the Generic2 Program	313
Executing the Generic2 Program	313
The Files of Generic2	314
The <i>WinMain()</i> of Generic2	325
Enabling the Mouse	325
Initialization Before the Message Loop	326
Playing Sound Sections Within the Message Loop	327
The <i>WndProc()</i> of Generic2	328
Disabling the Mouse	329
Multi-Instances	330
The SayName Program	330
Compiling and Linking the SayName Program	330
Executing the SayName Program	331
The Files of SayName	332
The <i>WinMain()</i> of SayName	343
The Message Loop of SayName	344
Monitoring the Windows Session	345
The Organ Program	347
Compiling, Linking, and	
Executing the Organ Program	347
The Files of Organ	349
The <i>WinMain()</i> of Organ	350
The Message Loop of Organ	351
Initializing the Scroll Bar	352
Responding to Scroll Bar Changes	353
Processing Keyboard Keys	353
Playing the Organ	355
Processing Push Buttons	355
The Instructions Dialog Box	356
Upgrading the Organ Program	356
The Control2 Program	356
Compiling, Linking, and	
Executing the Control2 Program	357
The Files of Control2	359
A Dialog Box as the Program's Main Window	359

	Opening the Sound Session	359
	The Message Loop of Control2	360
	The WM_CREATE Case of Control2	362
	The WM_PAINT Case of Control2	363
	The WM_CHAR Case of Control2	364
	The WM_HSCROLL Case of Control2	365
	Processing the Push Buttons	365
	Enabling and Disabling the Mouse Device	367
Chapter		
10	Stand-Alone Programs	369
	Converting the Dog Program to a Stand-Alone Program	370
	The TSlink Utility	373
	Executing the Stand-Alone Dog Program	374
	Using TSLabels	375
	The <code>__argv[]</code> Parameter	375
	The Third Parameter of <code>sp_OpenSession()</code>	376
	Converting Other Programs	376
	The WhoAml Program	376
	Compiling and Linking the WhoAml Program	385
	Linking the WhoAml Program with a Sound File	386
	The <code>lpzCmdLine</code> Variable	386
Chapter		
11	Using a Sound Card from Within a Windows Application	389
	The Windows Operating System and Sound Cards	391
	Installing the Sound Card	391
	Hardware and Software	
	Installation of the Sound Card	392
	Windows Drivers for the Sound Card	392
	The Hello2 Program	395
	Recording the .WAV File for the Hello2 Program	395
	Compiling, Linking, and	
	Executing the Hello2 Program	397
	The Files of the Hello2 Program	399
	The <code>#includes</code> of Hello2	410
	The Make File of the Hello2 Program	412
	The <code>WinMain()</code> of Hello2	412

The <i>WndProc()</i> of Hello2	414
Opening a Wave Session	417
Stand-Alone Programs	418
The <i>WM_CHAR</i> Case of Hello2	418
The <i>WM_COMMAND</i> Case of Hello2	419
The <i>ts_PlayWave()</i> Function	420
The Record Program	423
Compiling, Linking, and	
Executing the Record Program	423
The Files of the Record Program	425
The <i>WM_CREATE</i> Case of Record	425
Handling the Play Request	
Under the <i>WM_COMMAND</i> Case	427
Handling the Record Request	
Under the <i>WM_COMMAND</i> Case	428
Inserting a New Recording	
into an Existing .WAV File	432
Stopping the Recording and the Playback	432
The Sampling Rate of the	
Recording and Additional <i>ts_</i> Functions	435
The Record2 Program	435
Compiling, Linking, and	
Executing the Record2 Program	435
The Files of the Record2 Program	438
The <i>WM_COMMAND</i> Case of Record2	438
The Dog2 Program	444
Compiling, Linking, and	
Executing the Dog2 Program	444
The Files of the Dog2 Program	446
The Animation of the Dog2 Program	446
The Process of Creating an Asynchronous Show	447
Preparing a Timer	447
Preparing the Frames of the Show	448
Starting the Sound Playback of the Show	452
The Animation	452
Ending the Show	453
The PressAny Program	454
Compiling, Linking, and	
Executing the PressAny Program	454

The Files of the PressAny Program	457
The Show of the PressAny Program	457
Playing MIDI Files	462
The Files of the PlayMIDI Program	462
Compiling, Linking, and Executing the PlayMIDI Program	463
The Code of the PlayMIDI Program	463
Other <i>ts_</i> MIDI Functions	464
Mixing .WAV Files and MIDI Files	464

Chapter
12

Sound C Programming for DOS 465

Writing C Programs for DOS	
That Play Through the Internal Speaker of the PC	466
The MAKEexe.bat File	467
The PlayTS.c Program	468
Generating TS Sound Files	468
Compiling and Linking the PlayTS Program	469
Executing the PlayTS.exe Program	469
Naming the Sound Files	470
The C Code of the PlayTS Program	470
The <i>#include</i> Files	473
Picking Up the Name of the Sound File from the DOS Command Line	474
Opening a Sound Session	474
Clearing the Keyboard Buffer	476
Playing the Sound File	476
The Play Loop	477
Breaking from the <i>while(1)</i> Loop	478
The <i>_disable()</i> and <i>_enable()</i> Standard C Functions	478
Other <i>sp_play_</i> Functions	479
Memory Management and Virtual Memory	480
The PlayS Program	480
Compiling, Linking, and Executing the PlayS Program	480
The Code of PlayS.c	481
Using .S Files	481
The Size of the Playback Group	482
Stand-Alone Programs	483

Converting the PlayTS Program to a Stand-Alone Sound Program	483
Executing the Stand-Alone NiceDay Program	486
Converting Other Programs	487
Additional <i>sp_</i> Functions	
from the TegoSoft Sound Library	487
The Info4TS Program	487
Compiling, Linking, and Executing the Info4TS Program	488
The Code of the Info4TS.c Program	489
Disabling Ctrl-C	489
Extracting Information from the .TS File	489
Displaying the Current Position During Playback	490
The Info4S Program	491
Compiling, Linking, and Executing the Info4S Program	491
Using the <i>sp_get_</i> Family of Functions for Other Types of Sound Files (.WAV, .VOC, .SND)	492
Changing the Playback Speed	492
Synchronizing Moving Text with Sound	493
Compiling, Linking, and Executing the SayPress Program	493
The Code of the SayPress Program	494
Text to Speech	494
Animation, Graphics, and Playback	495
 Chapter 13	
The Sound Blaster Card Under DOS	497
Executing the PlayVOC Program	498
Compiling and Linking PlayVOC with the Borland C Compiler	499
Compiling and Linking PlayVOC with the Microsoft C Compiler	499
The Code of PlayVOC	499
Loading and Initializing the Sound Blaster Driver Program	500
Loading the .VOC File into Memory	503
Playing the Sound File	503
Stopping the Playback	504

Freeing the .VOC Buffer and Releasing the Sound Card	504
Other Sound Blaster Functions	505
Function Number 0:	
Determining the Driver Version	505
Function Number 1: Setting the Port Address	505
Function Number 2: Setting the Interrupt Number	506
Function Number 3: Initializing the Driver	506
Function Number 4:	
Setting the Speaker On and Off	506
Function Number 5:	
Setting the Status Word Address	506
Function Number 6: Starting the Playback	507
Function Number 7: Starting the Recording	507
Function Number 8:	
Stopping the Playback or the Recording	507
Function Number 9: De-installing the Driver	507
Function Number 10: Pausing the Playback	507
Function Number 11: Resuming the Playback	508
Creating Multimedia Programs for DOS with the Sound Blaster Sound Card	508

Appendix

Sound DLL	509
Advantages of Using DLL Sound Functions	510
Using the DLL Sound Library for Visual Basic and Other Windows Programming Languages	510
Disadvantage of Using DLL Sound Library	510
Using the Sound DLL	511
Using the DLL4Snd.DLL Dynamic Link Library (DLL)	511
Index	513