

Microsoft(DirectX(3

ffffffŠ”fff

„ffffff, <□,,,,,□•,□—

□,,,•□,,,,,,,,□,,□•’,%Ž–□–

–,,,<%,,,, “<“ <Š“,,,,,•Ž •–,,,• “,,,,,,,,,
Microsoft , ,ffffff,< ,,,, ffff fff,“<,,, ’,“< • ’ Ć ,,’“ —
Ć,•Ž,,,, ,ffffff, Microsoft , –,,,<%,,,, “< • ’ Ć ,,’“ —Ć,<%,—
,,,,,,,,

(1996 Microsoft Corporation. All rights reserved.

Microsoft ActiveMovie Direct3D DirectDraw DirectInput DirectPlay DirectS
ound DirectX MS-DOS Win32 Windows ,,Windows NT, • Microsoft
Corporation,• ,,,,‘ , ,,, •,,,

,,‘, •–,%Ž–,ŠŽ, •,,,

‘1
DirectX 3, %
μDirectX,—“ §
DirectX Windowsfff fffŠ,—“ §
f©©fffŠ”,,,,ffffff,’<§
DirectX SDK §
DirectX SDKfff fff §
fff’<,Ž— §
DirectX,fff fff fffffff fff §
fff fff fffffff fff §
IUnknownfff ffff.....§
DirectX COMfff□ffff.....§
C++,COM,fff ffff.....
C,,COMffffff,,ffff.....§
fff fffffff—,ffffff.....§
DirectX 3 SDK,, <”,,?.....§
<—.....§

DirectX,—“
Microsoft DirectX™ Software Development Kit (SDK)
, fffff fff,ffffff,ffff fff, Ć,,,,•—
,ff f,’<,, ,ff fff, ,,ffff ffffffffff fff ffff(API)fff,,□Di
rectXffff□,□Ž□,ffff□ff□f,ffffffffffff fffŠ”,—,,,
Microsoft, Microsoft
Windowsfff fffffff,“ ,,ffff fff,fff fff, MS-
DOS,f f ff f<,” ,,ffff fff,fff□fff^□,,,,,DirectX,Š”, Š<, • %o
,, “ ,• %o
,,, f f, ,,,fff ffffŠ<,’<,,,,, Windows,,f fŠ”,‘ ,,,, ,SDK,Š”,,
,,,
,, , DirectX,Ž—,,,,□—,—“□—
,,□ffffffŠ”Ž,,,f□ffff”^<,’<□f□ffffŠ”Ž,,,ffffff, ’,,
•.....DirectX Windowsfff fffŠ”,—“
•.....f□ffffŠ”,,,ffffff,’<

DirectX Windowsfff fffŠ”,—“
DirectX,^,—“ „MS-DOS,Ž—,,,,<”,,ĆŠ ,,ffff,’<, MS-
DOSfff ff f,ffff fff•,,,,,,^ ,fff fff,□,□,„f□ffffff□f,,,f□f
fff<□Š□, Š,Ž, ,,,,
Microsoft, Windowsf f,ffff fff, Ć ,, —,ffff fffff ,—
%o”,f ffff,,ffffff fff,ffffff,ffff,’<,,,DirectX,Š”,□DirectX,□ffff□
f,ffffff□fff,Ž,Ć,, f ffff,’ , ‘ĆŠ,,,, f ffff,ffff fff,,Š,^
Š,,fff ffff,’<,,,
ffffff fff,Windowsf f,f f, ^%o,ffffff ,—,,,
•.....fff□fffĆ ,,“• Ć,,,ffffff ff f
•.....ffffff, ‘,Windowsf ffff,ffffff
•.....DirectPlay,Š,□Windowsfffff,’ f ff

f ffffŠ”,,,,ffffff,’<
Microsoft,DirectX,Š”,,,,^,—“,,,, Windowsfff ffffŠ<,,f fŠ”,‘ ,,, D
irectX^‘, f fffffff□f—,Š”,f□f,Ž—,MS-
DOSf□f,,,□,„f□f,Š”Ž, ,,,,f f, ‘,f ffffŽ‘, ,,,,,,, ,DirectX,,
f fŠ”Ž, f ffff,fffffffff,—“Ž,,,, ffff”^< ,,—““,,,,,
,,,,, —,—“□f□ffff%Ž‘,□ffffff□fff,ffff□fff,Š”Ž,f□ffffff (IHV)
,,,ff ffff,Š,,,ffffff,’<,,,,, DirectX SDKfff fff, Ć%o
,,,,‘ ,,,f fffffff f<”,Ž—
,’<,,,,,, ‘ , ,□ffffff,,,<”,ffff f,, ,Š,, fffff,f ffff,’,”
—,,,—, , ,ff f,,,,,—Ž,,,,,
< Ž—%o”,,,,ffffff ffff<”, ^%o,Š,,,
• f□f□ff□f□f□ffffff,fffffffffff (GDI)

•
•

- の
- 3 (3D) 3D の
- Z 3D
- 2 (MB) 3D
- ののの

- 3D
- の
-

の DirectXŠf ffffffff f,, fff ,%oE,Ž,,,, —
 ff f,,DirectX,^<”,,, YUVfff,“Šf ffffffff fff,ff f,,,,,
 DirectX SDK
 ,,ffffff,, DirectX SDK,,,,,DirectXŽ‘, ,< , ^%o,ffff,,, -,,
 • DirectX SDKfff fff

• **fff’<,Ž—**

DirectX SDKfff□fff

DirectX SDK,□Windows
 ののののの

- DirectDraw®のの
 のののの
 DirectDraw DirectDraw
- DirectSound®
 DirectSound DirectSound
- DirectPlay®のののDirectPlay DirectPlay
- Direct3D™ 3D

- ffff,'<,, ,fff fff,,,, •, Direct3D,Direct3D,,,,Ž ,,,
- DirectInput™ Windows の “—
API,ffff,ff fff,“—”,f f,'<,, Ē fffffff fff f f f,ff f,,,
, ,fff fff, DirectInput ffff,““,Ž ,,,
 - DirectSetup, 1%,Ē, ,ffff f,Š—
,,DirectXfff ff,'<,, ,fff fff,,,, •, DirectSetup
DirectSetup,,,,Ž ,,
 - AutoPlay,□CD-ROMffffff,ffffff,f'
Windows 95 のののAutoPlay AutoPlay

AutoPlay Microsoft Win32® API の DirectX のの

DirectX SDK の

DirectX のののSDK Sdk\Samples の

の

DirectX ののの

の IDirectDraw2::CreateSurface

IDirectDraw2_CreateSurface
DirectDraw

```
ret = IDirectDraw2_CreateSurface (lpDD, &ddsd, &lpDDS,  
    NULL);
```

のの

DirectX

DirectX

(COM) COM ののの

-
- IUnknown
- DirectX COM
- C++ COM
- C COM の

f

fff fff fffffff fff

DirectX SDK,“•,API, COM,Š,,ffffff,,fff ffff,, , COM

OLE „ fff ff
COM OS

DirectX API OLE のの

,,,,, COMfff ffff,',,ffffffš,ž,„,,,ffff,ffff,£,, ,,, fffffff
f,£ ,fff DirectDraw
IDirectDraw2::GetDisplayMode IDirectDraw2fff ffff,',,',
ffffff, ž ž,‘,ffffff,ffff,, ‘,ffffff,’‘,,fff f
OLE
(\mathcal{O})

```

QueryInterfaceffff, OLEffffff,,,œ ,ffff,,,,, ,,,, ,ffffff,ff f
,f のののIUnknown
,,,,
IUnknownfff ffff
COMfff ffff,,, IUnknown,œ,,,fff ffff,“ ,,, ,fff のの
‘ ,DirectX
IUnknown ,,,fff

```

- AddRef \mathcal{O}
- QueryInterface, $\check{Z}', fff ffff, , ffff, \text{—}, , , , , , ffffff, ff f, \text{<}, , , , \%o$
 $, ,$
- Release $fff, ffffff, , ffff, 0, , , , , ffffff, \%o^*, , ,$

1 AddRef,Release,Ž□ffff,ffffff,,□,, DirectDrawSurfaceffff
,fff f,∅ AddRef

AddRef	Release	
	Release	0

QueryInterface

のの QueryInterface Release AddRef

```
xe "IUnknown\:\:AddRef"§
```

IUnknown::AddRef

ULONG AddRef();

-

1
のAddRef の
Release
の IUnknown 1

xe "IUnknown\:\:QueryInterface"§
IUnknown::QueryInterface
HRESULT QueryInterface(REFIID riid, LPVOID* obp);

□□□□□□□□の COM □□□□□□□□□□□□□□
,,ff,,,,,,,,fff□ffff,Ž—,,□
• ☒, □, , □☒, , □□ S_OK
E_NOINTERFACE の ffff☒—,ff ',,,,,•, fff ffff☒—
,ff ', fff fff^,fff,,
DirectDraw

DDERR_INVALIDOBJECT

DDERR_INVALIDPARAMS

DDERR_OUTOFMEMORY (IDirectDrawSurface2 の)

DirectSound

DSERR_GENERIC (IDirectSound IDirectSoundBuffer)

DSERR_INVALIDPARAM

DirectPlay

DPERR_INVALIDOBJECT

DPERR_INVALIDPARAMS

Direct3D
の
QueryInterface
Direct3D の Direct3D

riid

 \mathcal{O}
$$obp$$

0000000000000000000000000000000000のfffeaseffff,œ,,-
,,QueryInterfacefff,,Microsoft,fff\,,,, -
,<“,š,,,,,ffffff,š’,,,,,,,,,,
,,ffff,fffffffff,,œ,,IUnknownffffffffff,^.,,,

```
xe "IUnknown\:\:Release"§
```

IUnknown::Release

```
ULONG Release();
```

●

0 AddRef

```
,ffff, fffffff,,,\u00c9 ,,\u00a0Unknownfff ffff,\u00e7,,  
DirectX COMfff ffff  
DirectX SDK,fff ffff, COMffffffff\u00a2,\u00a2 \u00a2-\u00a2,fff, ,,  
IDirectDraw2 IDirectSound IDirectPlay,,, ffff,\u00b0,fffffff,,,,,fff fff  
f, IUnknown OLEfff ffff,\u00a2 \u00a2- ,,\u00a2,\u00a2-\u00a2  
ffffff, , COMffffff \u00a2,\u00a2-\u00a2  
,,,Win32,CoCreateInstance\u00a2 ,,\u00a2, \u00a2ffffff,,ff
```

```

ffffffffffff(DLL)',“%o,,Š  ,, —,,
~”, DirectX SDK,fffffffff, Šfff,,,,Ž—
,ffffff,’¿,, ‘ff ff ffffffff, „ffffff,“ ,,,,,, ,,,, DirectDrawfff
ff, ffffffff,*,,,, „ffffff,—
, ffffffff,*,DirectDrawSurfaceffffff, f ffffffff,*,DirectDrawPalettef
ffff, ,,,,,, “—
, DirectSoundffffff,f ffff f,*, „f f ,%oŒ,*,DirectSoundBufferffffff
f,  ,,
%o^ffffff  ,”—,%o, Ž—,fffffffff, fff f,fff,

```

C++ COM

C++ COM
 ,□,,,□ffffff,fffffffff,’¿,,,□Ž,’¿, のの
 C++

C++ COM V のの
 V
 QueryInterface の QueryInterface
 V

COM C++ C++ this の COM
 COM C++ COM
 C++ V C++の this C++

C の COM の

COM C C

- のの (の this)
- のの V

□□の□□□□ C □□□

IDirectDraw2::CreateSurface □□□□□
 Œ,□,,,,DirectDrawfffff,Š~,,,,f□fff,□□
 ,,□

ret = lpDD->lpVtbl->CreateSurface (lpDD,
 &ddsd, &lpDDS,
 NULL);

lpDDfff□f,□□,,f□fff,Š~,,,,DirectDrawf
 ffffff,Ž□,,□,,,,,ffff,□f□fff□•□“(&ddsd
),□',□□,,f□fff,,ffff(&lpDDS),•,□

IDirectDraw2::CreateSurfacefff,Œ,□,,,
 □,,DirectDrawfffffVf□ff,,Ž□,Š,□,,,Vf
 □ff,,ffff,,Ž□,Š,□ffff,«,,,□□,fff□f,□ff
 ff,«“,,,,□,,,□□,,,DirectDrawfffff,,Ž□,,,
 □

COMfffffffffff,C,C++,Œ,□,^,,□-,,,,□C+
 +,“,ffff,Ž,Ž,(C++
 ,□lpVtblfff□f,,Ž□,Š,□thisfff,“,,,,,,)□

ret = lpDD->CreateSurface(&ddsd,
 &lpDDS, NULL)

fff□fffffffffff-,fffff

- COM
 QueryInterface AddRef Release

C++ の
 DirectX

C++の

DirectPlay IDirectPlay2 IDirectPlay2A IDirectPlayLobby
 DirectPlay DirectPlay Version 3 ?

Direct3D

API の Direct3D Direct3D

DirectInput

DirectInput

DirectSetup

DirectSetup

AutoPlay

AutoPlay の fffff, , Windows NT®, •,Ž,,

•<

^%o,-•,,•<, -,,

•<

^_

fffff‘

ff ffff ,,,• ,•, Ž ,’,—,,,,,,,,, ,,,, ff ffff SetCursorPos(X, Y)
 ,, X Yfff f,’,,Ž ,’,—,,,,,,,,,

[]
 fffff,fff f,Š,

|
 ,,,,,,,,,—•,“Ž,•,,

...
 ”, −,Œ,•,,Ž,

.
 .
 .
 ffffffff fff, —•,•,

Ž, ‘,,,,,^%,^-,•,
 •◀
 ^_

SMALL CAPITALS
 f□f□f□fff□f□ffff□fff,–‘,•,□,,,,□ALT+SPACEBAR□

FULL CAPITALS
 ‘•,Œ,□“–‘,•,□,,,,f□ff,•◀,,,□’□,•,□

monospace
 f□ffffff,◁,□ffffff,ff□fff,Ž,□