Microsoft(DirectX(3
ƒƒƒƒƒƒŠ"ƒƒƒ

,,ƒƒƒƒƒƒ,‹□,,,,,□•,□—□,,,•□,,,,,,,,□,,□•',‰Ž–□–

–,,,‹‰o,,,,   "‹" ‹Š",,,,,,•Ž •–,,,•   "',,,,,,,,,
Microsoft ,   ,,ƒƒƒƒƒƒ,‹ ,,,,,   ƒƒƒƒ ƒƒƒ,"‹,,,,   ',"‹   • '   Œ ,,'," —
Œ,•Ž,,,,   ,,ƒƒƒƒƒƒ, Microsoft ,   –,,,‹‰o,,,, "‹   • '   Œ   ,,'," —Œ,‹‰o,—
,,,,,,,,

Microsoft ActiveMovie Direct3D DirectDraw DirectInput DirectPlay DirectSound DirectX MS-DOS Win32 Windows ,,,Windows NT, • Microsoft Corporation,• ,,,,,', ,,,,, •,,,

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DirectX 3, ‰
µDirectX,–“ §
DirectX Windows*ffff fff*Š”,—“   §
*f©©fff*Š”,,,,*ffffff*,’‹§
DirectX SDK §
DirectX SDK*fff fff* §
fff’‹,Ž—§
DirectX,*fff fff ffffff fff* §
fff fff ffffff fff§

DirectX,–"

Microsoft DirectX™ Software Development Kit (SDK)
, *fffff fff,ffffff,ffff fff,* Œ,,,,,•—
,*ff f,'‹,,, ,ff fff,* ,,*ffff ffffffffff fff ffff*(API)*fff,,,*□Di
rectX*fffff*□,□Ž□',*ffff*□*ff*□*f,ffffffffff fff*Š",—,,,,

Microsoft, Microsoft
Windows*fff ffffffff*," ,,*ffff fff,fff fff,* MS-
DOS,*f f ff f*‹," ,,*ffff fff,fff*□*fff*ˆ□,,,,,,,DirectX,Š",, Š‹, • ‰
,, " ,• ‰
,,, *f f,* ,,,,*fff ffff*Š‹,'‹,,,,,,, Windows,,*f f*Š",' ,,,,, ,,SDK,Š",,,
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,, ,, DirectX,Ž—,,,,,,□—,—",□–
„□*ffffff*Š"Ž,,,,*f*□*ffff*""ˆ□,'‹,□*f*□*ffff*Š"Ž,,,,*ffffff,* ',,,
•...DirectX Windows*ffff fff*Š",—"
•..*f*□*ffff*Š",,,*ffffff,*'‹

DirectX Windows*ffff fff*Š",—"
DirectX,'ˆ,–", "MS-DOS,Ž—,,,,,‹",,ŒŠ ,,,*ffff,*'‹, MS-
DOS*fff ff f,ffff fff*•,,,,,,ˆ ,*fff fff,*□,,□,,,*f*□*ffffffff*□*f,,,,f*□*f*
fff‹□Š□, Š,Ž, ,,,,,,

Microsoft, Windows*f f,ffff fff,* Œ ,,, —,*ffff fffff* ,——
‰",*f ffff,,fffff fff,ffffff,ffff,*'‹,,,,DirectX,Š",□DirectX,□*ffff*□
f,ffffffff□*fff,*"Ž,,Œ,, *f ffff,*' , 'ŒŠ,,,,, *f ffff,ffff fff,,*Š,ˆ
Š,,*fff ffff,*'‹,,,,

*fffff fff,*Windows*f f,f f,* ˆ‰,*fffff* ,——,,,,
•..*fff*□*fff*Œ ,,,"• Œ,,,*fffff ff f*
•..*ffffffff,* ',Windows*f ffff,ffffff*
•..DirectPlay,Š,□Windows*fffff,*' *f ff*

*f ffff*Š",,,,*ffffff,*'‹
Microsoft,DirectX,Š",,,,,'ˆ,–",,,,, Windows*fff ffff*Š‹,,*f f*Š",' ,,, D
irectX*ˆ', f ffffff*□*f*—,Š",,,*f*□*f,*Ž—,MS-
DOS*f*□*f,,,*□*,,,,*f*□*f,*Š"Ž, ,,,,,*f f,* ',*f ffff*Ž', ,,,,,,,,,,,, ,,,DirectX,,
*f f*Š"Ž, *f ffff,,ffffffffff,*—",Ž,,,,, *ffff*"ˆ' ,,,—","„,,,,,,
,,,,,, —,–",□*f*□*ffff*‰Ž,',□*fffff*□*fff,ffff*□*fff,*Š"Ž,*f*□*fffffff* (IHV)
,,,*ff ffff,*Š,,,*ffffff,*'‹,,,,,,, DirectX SDK*fff fff,* Œ‰
,,,,,' ,,,*f ffffffff f*‹",Ž—
,'‹,,,,,,,,,,,,,, '„ ,,,□*fffff,,,,,*‹",*ffff f,,* ,,ˆŠ,, *ffffff,f ffff,*'„,"
—,,,,–, ,, ,,*ff f,,,,,,,,*–Ž,,,,,,,,,,
‹ Ž—‰",,,,,,,*ffffff ffff*‹", ˆ‰,**Š,,,,**
• *f*□*f*□*ff*□*f*□*f*□*fffff,ffffffffff* (GDI)

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  3D

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- 2 (MB) 3D
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  ƒƒ ƒ,,,DirectX,ˆ‹",,, YUVƒƒƒ,"Šƒ ƒƒƒƒƒƒƒ ƒƒƒ,ƒƒ ƒ,,,,,
DirectX SDK
,,ƒƒƒƒ,, *DirectX* SDK,,,,,,DirectXŽ', ,‹ ,, ˆ‰,ƒƒƒƒ,,,, −,,
- *DirectX SDKƒƒƒ ƒƒƒ*

• ƒƒƒ'‹,Ž—

DirectX SDKƒƒƒ☐ƒƒƒ

DirectX SDK,☐Windows
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,$ffff,ff fff,$"—‹",$f f,$'‹,, Œ $ffffffff fff f f f,ff f,$,,,
  , ,,$fff fff,$ DirectInput $ffff,,$""‚Ž ,,,

- DirectSetup, 1‰,Œ, ,,$ffff f,$Š—
  ,,DirectX$fff ff,$'‹,, ,,$fff fff,,,,,$ • DirectSetup
  DirectSetup,,,,,Ž ,,

- AutoPlay,□CD-ROM$ffff,ffffffff,$'
  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

$fff fff ffffff fff$

DirectX SDK,'••,API, COM,Š,,*ffffff*,,,*fff ffff*,,   ,   COM
の

OLE   ,, *fff ff*
COM   OS

DirectX API   OLE *のの*

,,,,,, COM*fff ffff*,',,*ffffff*Š,Ž,",,,,*ffff*,*ffff*,Œ,,, ,,,, *fffffffff*
f,Œ ,*fff*   DirectDraw
IDirectDraw2::GetDisplayMode   IDirectDraw2*fff ffff*,',,',,,

ffffff, Ž Ž,',*ffffff*,*ffff*,, ',*ffffff*,'‹,,*fff f*
OLE
                                                (*の*   )
,,
QueryInterface*ffff*, OLE*ffffff*,,,,Œ ,,*ffff*,,,,,, ,,,,, ,,*ffffff*,*ff f*
,,*f のののの*IUnknown   ,,,,

IUnknown*fff ffff*

COM*fff ffff*,,,, IUnknown,Œ,,,*fff ffff*,," ,,, ,,*fff のの*
'   ,DirectX   IUnknown   ,,,*fff*

- AddRef *の*

- QueryInterface, Ž',,*fff ffff*,,*ffff*,—‹,,,,,,, *ffffff*,*ff f*,,‹",,,, ‰
,,

- Release   *fff*,*ffffff*,, *ffff*,0,,,,,, *ffffff*,‰•,,,

AddRef,Release,Ž□*ffff*,*ffffff*,,□,,   DirectDrawSurface*fffff*
1   ,*fff f*,*の* AddRef

AddRef   Release
Rel**ease**   0

QueryInterface
                                                                    QueryInterface
のの
        QueryInterface   AddRef
                                                Release

xe "IUnknown\:\:AddRef"§

IUnknown::**AddRef**

ULONG AddRef();

-

1

のAddRef の

Release

の **IUnknown** 1

xe "IUnknown\:\:QueryInterface"§

IUnknown::QueryInterface

HRESULT QueryInterface(REFIID riid, LP**VOID* obp);**

□□□□□□□□□の **COM** □□□□□□□□□□□□□□□ *„ƒƒ,,,,,,,ƒƒƒ□ƒƒƒƒ,Ž—,,,□*

- Œ,□,,□Œ,,□□ S_OK
  E_NOINTERFACE *の ƒƒƒƒŒ—,ƒƒ ',,,,,•, ƒƒƒ ƒƒƒƒŒ—
  ,ƒƒ ', ƒƒƒ ƒƒƒ'ˆ,ƒƒƒ,,,*

DirectDraw

DDERR_INVALIDOBJECT

DDERR_INVALIDPARAMS

DDERR_OUTOFMEMORY (IDirectDrawSurface2 の)

DirectSound

DSERR_GENERIC (IDirectSound　IDirectSoundBuffer　)

DSERR_INVALIDPARAM

DirectPlay

DPERR_INVALIDOBJECT

DPERR_INVALIDPARAMS

Direct3D　　　QueryInt**erface**　　　　　**Di**rect3D ⑦ Direct3D
⑦⑦

riid

⑦

obp

　□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□⑦□ *ƒƒ*ease*ƒƒƒƒ*,Œ,□,•—
„,□QueryInterface*ƒƒƒƒ*„,□Microsoft,*ƒ*□*ƒƒ*□*ƒƒ*,□Œ`,,,,□–
,‹",Š□,,,,,,*ƒƒƒƒƒƒ*,Š',,,,,,,,□
,,*ƒƒƒƒ*,□*ƒƒƒƒƒƒ*,,,,Œ□,,,IUnknown*ƒƒƒ*□*ƒƒƒƒ*,ˆ•,,,□

xe "IUnknown\:\:Release"§

IUnknown::Release

ULONG Release();

•

　　　　　0　AddRef

　,*ƒƒƒƒ*,　*ƒƒƒƒƒƒ*,,,,Œ　,,,IUnknown*ƒƒƒ*　*ƒƒƒƒ*,ˆ•,,,

DirectX COM*ƒƒƒ*　*ƒƒƒƒ*

DirectX SDK,*ƒƒƒ*　*ƒƒƒƒ*,　COM*ƒƒƒƒƒƒƒ*Š‘,"　,Š–",*ƒƒƒ*,　　,,,
　　IDirectDraw2　IDirectSound　IDirectPlay,,,,　*ƒƒƒƒ*,•,*ƒƒƒƒƒƒ*,,,,,,,,*ƒƒƒ*　*ƒƒƒ*
　　ƒ,　IUnknown OLE*ƒƒƒ*　*ƒƒƒƒ*,,'　"　,,,　,,,,Š–
　　ƒƒƒƒƒƒ,　　,　COM*ƒƒƒƒƒƒ*　　,˜",—
　　,,,,Win32,CoCreateInstanceŠ　,,,,,,　Š*ƒƒƒƒƒƒ*,,,*ƒƒ*

ƒƒƒƒƒƒƒƒƒƒ(DLL)',"‰o,,,Š ,,, —,,,

˜",, DirectX SDK,*ƒƒƒƒƒƒƒƒ*, Š*ƒƒƒ*,,,,,Ž—**

,*ƒƒƒƒƒ*,'‹,, '*,ff ff ffffffff***, ,,*ƒƒƒ*ƒ,," ,,,,,,,, ,,,, DirectDraw*ƒƒƒƒ**
ff, *ƒƒƒƒƒƒƒƒ*ff,•,,,, ,,*ƒƒƒƒƒ*,—

, *ƒƒƒƒƒƒƒƒ*,•,DirectDrawSurface*ƒƒƒƒƒƒ, ƒ ƒƒƒƒƒƒƒ*,•,DirectDr**awPalette*ƒ**
***ƒƒƒƒ*, ,,,,,,,, "—**

, DirectSound*ƒƒƒƒƒ*,ƒ ƒƒƒƒ ƒ*,•, ,,ƒ ƒ ,‰Œ,•,DirectSoundBuffer*ƒƒƒƒ
ƒ, ,,

‰ˆ*ƒƒƒƒƒ ,"—,‰, Ž—,ƒƒƒƒƒƒƒƒƒƒ, ƒƒƒ ƒ,ƒƒƒ,*

C++ COM

C++ COM
,□,,,,□*ƒƒƒƒƒ*,*ƒƒƒƒƒƒƒƒ*,'‹,,,□Ž‹',‹, のの
C++

C++ COM V
V のの
QueryInterface の
QueryIn*terface*
V

COM C++ C++ this の
COM **C++** COM
C++ C++の this
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IDirectDraw2::CreateSurface □□□□□
**Œ,□,,,,Directraw𝑓𝑓𝑓𝑓𝑓,Š˜,,,,,𝑓□𝑓𝑓𝑓,□□
,,□**

**ret = lpDD->lpVtbl->CreateSurface (lpDD,
&ddsd, &lpDDS,**

    NULL);

**lpDD𝑓𝑓𝑓□𝑓,□□,,𝑓□𝑓𝑓𝑓,Š˜,,,,,DirectDraw𝑓
𝑓𝑓𝑓𝑓,Ž□,,□,,,,,,𝑓𝑓𝑓𝑓,□𝑓□𝑓𝑓𝑓□•□"(&ddsd
),□',□□,,𝑓□𝑓𝑓𝑓,,𝑓𝑓𝑓𝑓(&lpDDS),•,□**

**IDirectDraw2::CreateSurface𝑓𝑓𝑓𝑓,Œ,□,,,
□,,DirectDraw𝑓𝑓𝑓𝑓𝑓V𝑓□𝑓𝑓,,Ž□,Š,□,,,V𝑓
□𝑓𝑓,,𝑓𝑓𝑓𝑓,,Ž□,Š,□𝑓𝑓𝑓𝑓,‹‹,,,□□,𝑓𝑓𝑓□𝑓,□𝑓𝑓
𝑓𝑓,‹",,,,,□,,,□□,,,DirectDraw𝑓𝑓𝑓𝑓𝑓,,Ž□,,,
□**

**COM𝑓𝑓𝑓𝑓𝑓𝑓𝑓𝑓𝑓,C,C++,Œ,□,ˆ,,□−,,,,□C+
+,",𝑓𝑓𝑓𝑓,Ž,Ž,(C++
,□lpVtbl𝑓𝑓𝑓□𝑓,,Ž□,Š,□this𝑓𝑓𝑓𝑓,",,,,,,)□**

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

𝑓𝑓𝑓□𝑓𝑓𝑓𝑓𝑓𝑓𝑓−,𝑓𝑓𝑓𝑓𝑓𝑓

−   COM   C++ の
QueryInterface AddRef Release   DirectX
              C++のの

の の C++のの this

C

のIDirectDraw2::GetCaps の C++の

HRESULT GetCaps(LPDDCAPS lpDDDriverCaps,

LPDDCAPS lpDDHELCaps);

C のの

HRESULT GetCaps(LPDIRECTDRAW lpDD,

LPDDCAPS lpDDDriverCaps, **LPDDCA**PS lpDDHELCaps);

lpDD   DirectDraw   DirectDraw の

DirectX 3 SDK ?

DirectX 3 SDK は**DirectX 2 SDK** のののの SDK ・・・・・・・・・・・・・・・・・・DirectX 2
SDK,ƒƒƒƒ,DirectX 1 SDK,□,,,ƒƒƒƒ□ƒƒƒ,,,,□ƒ□ƒ,•□,,,□ƒƒƒƒƒ,Ž□,,,,,,,□
,,□,,-",□DirectX 2 SDK,,,',□,□,,SDK,`,,^,,,,,,,,,,,□-
,Ž□,,,,,,-‰,,,,,Ž□,の

Direct`Draw`

API,•□,,,□ƒƒƒƒ,DirectDrawƒƒƒƒ□ƒƒƒ,Ž`,,□-
,□ƒƒƒƒ,,,'‹,,ff□ƒƒƒƒ,,,,,",,□ff□ƒƒƒƒ,,,,,□DirectDraw,DirectDrawƒƒ□ƒƒƒ
ƒ,Ž□,,,,,□

Direct`Sound`

DirectX
3,□ƒƒƒƒ□ƒƒƒ,‰Œ,•,,,,,,,ˆ',•□,
   DirectSound3D □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
DirectSound のの□•,□DirectSound,□,3ŽŒ,‰
,Ž□,,,,□

DirectPlay

DirectPlay　　　　　IDirectPlay2　IDirectPlay2A　IDirectPlayLobby
　　　　　　　　　DirectPlay　　　DirectPlay Version 3　　?

Direct3D

API のののDirect3D　　Direct3D

DirectInput

DirectInput

DirectSetup

DirectSetup

AutoPlay

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

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•‹
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$fffff$'
ff　$ffff$　,,,•　,•,　Ž　,',—,,,,,,,,,,　,,,,　ff　$ffff$ SetCursorPos(X, Y)
,,　X　Yfff　f,',,Ž　,',—,,,,,,,,,,

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SMALL CAPITALS
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FULL CAPITALS
‘••,**Œ**,□‘‘,–‘,•,□,,,,,*ƒ□ƒƒ*,,•‹,,,□’□,•,□

monospace
ƒ□ƒƒƒƒƒ,‹‘,□*ffffff,ff□fff,***Ž**,□