Obsolete IDL Features

IDL Version 6.1
July, 2004 Edition

Copyright © Research Systems, Inc.
All Rights Reserved

Research Systems Inc.

0704IDL61OBS

Restricted Rights Notice

The IDL®, ION Script™, and ION Java™ software programs and the accompanying procedures, functions, and documentation described herein are sold under license agreement. Their use, duplication, and disclosure are subject to the restrictions stated in the license agreement. Research Systems, Inc., reserves the right to make changes to this document at any time and without notice.

Limitation of Warranty

Research Systems, Inc. makes no warranties, either express or implied, as to any matter not expressly set forth in the license agreement, including without limitation the condition of the software, merchantability, or fitness for any particular purpose.

Research Systems, Inc. shall not be liable for any direct, consequential, or other damages suffered by the Licensee or any others resulting from use of the IDL or ION software packages or their documentation.

Permission to Reproduce this Manual

If you are a licensed user of this product, Research Systems, Inc. grants you a limited, nontransferable license to reproduce this particular document provided such copies are for your use only and are not sold or distributed to third parties. All such copies must contain the title page and this notice page in their entirety.

Acknowledgments

IDL® is a registered trademark and ION™, ION Script™, ION Java™, are trademarks of Research Systems Inc., registered in the United States Patent and Trademark Office, for the computer program described herein.

Numerical Recipes™ is a trademark of Numerical Recipes Software. Numerical Recipes routines are used by permission.

GRG2™ is a trademark of Windward Technologies, Inc. The GRG2 software for nonlinear optimization is used by permission.

NCSA Hierarchical Data Format (HDF) Software Library and Utilities
Copyright 1988-2001 The Board of Trustees of the University of Illinois
All rights reserved.

NCSA HDF5 (Hierarchical Data Format 5) Software Library and Utilities
Copyright 1998-2002 by the Board of Trustees of the University of Illinois. All rights reserved.

CDF Library
Copyright © 2002 National Space Science Data Center
NASA/Goddard Space Flight Center

NetCDF Library
Copyright © 1993-1999 University Corporation for Atmospheric Research/Unidata

HDF EOS Library
Copyright © 1996 Hughes and Applied Research Corporation

This software is based in part on the work of the Independent JPEG Group.

Portions of this software are copyrighted by DataDirect Technologies, 1991-2003.

Portions of this software were developed using Unisearch's Kakadu software, for which Kodak has a commercial license. Kakadu Software. Copyright © 2001. The University of New South Wales, UNSW, Sydney NSW 2052, Australia, and Unisearch Ltd, Australia.

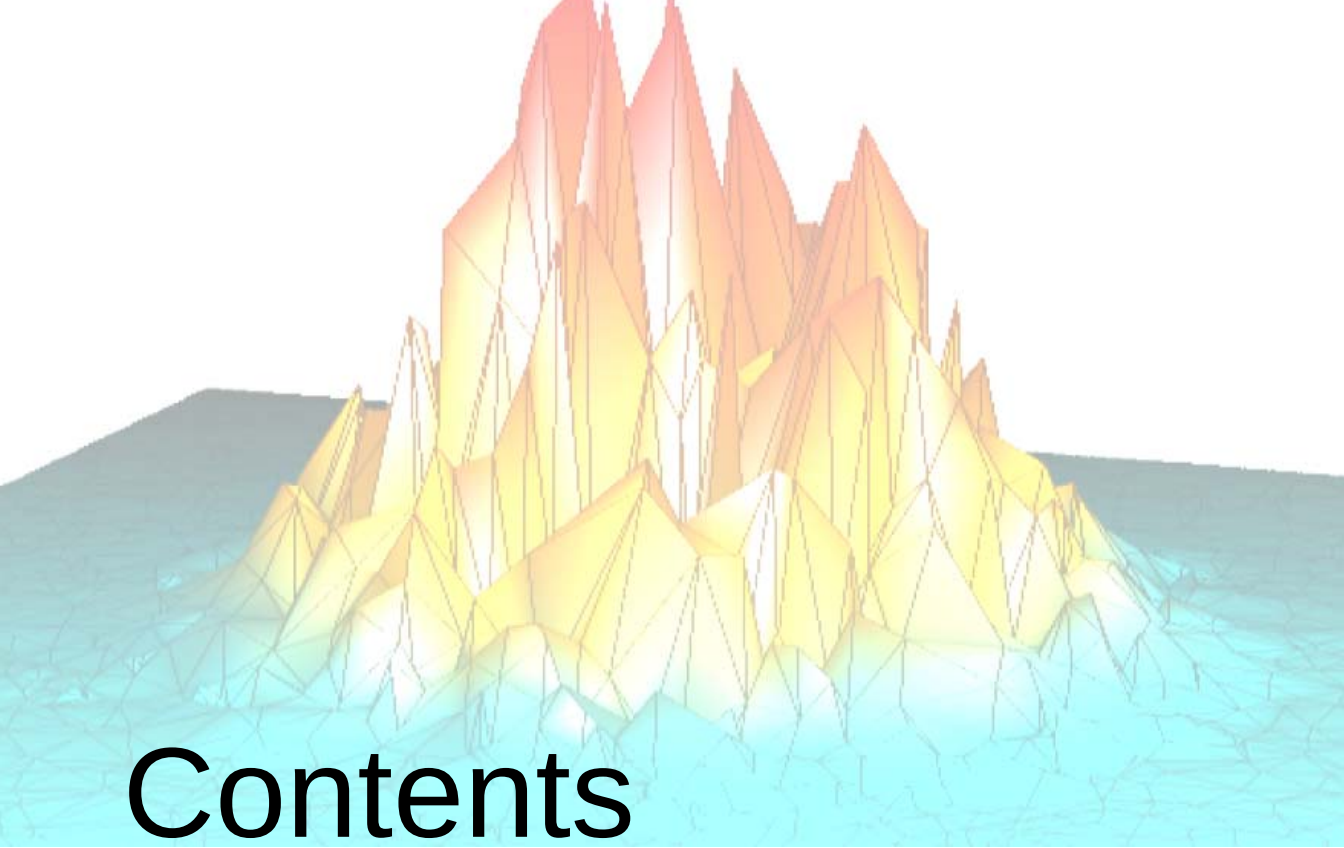
Portions of this computer program are copyright © 1995-1999 LizardTech, Inc. All rights reserved. MrSID is protected by U.S. Patent No. 5,710,835. Foreign Patents Pending.

Portions of this software are copyrighted by Merge Technologies Incorporated.

This product includes software developed by the Apache Software Foundation (http://www.apache.org/)

IDL Wavelet Toolkit Copyright © 2002 Christopher Torrence.

Other trademarks and registered trademarks are the property of the respective trademark holders.



Contents

Chapter 1: Overview **9**

Backwards Compatibility 10

IDL Internal Routines 10

Routines Written in IDL 10

Detecting Use of Obsolete Features 11

Documentation for Older Obsolete Routines 12

Chapter 2: Obsolete Routines **13**

DDE Routines 14

DELETE_SYMBOL 15

DELLOG 16

DEMO_MODE 17

DO_APPLE_SCRIPT 18

ERRORF 20

FINDFILE 21

GETHELP 23
GET_SYMBOL 25
HANDLE_CREATE 26
HANDLE_FREE 29
HANDLE_INFO 30
HANDLE_MOVE 32
HANDLE_VALUE 34
HDF_DFSD_ADDDATA 36
HDF_DFSD_DIMGET 38
HDF_DFSD_DIMSET 39
HDF_DFSD_ENDSLICE 41
HDF_DFSD_GETDATA 42
HDF_DFSD_GETINFO 43
HDF_DFSD_GETSLICE 45
HDF_DFSD_PUTSLICE 47
HDF_DFSD_READREF 48
HDF_DFSD_SETINFO 49
HDF_DFSD_STARTSLICE 53
HDF_VD_GETNEXT 55
INP, INPW, OUTP, OUTPW 56
LIVE_Tools 57
LIVE_CONTOUR 58
LIVE_CONTROL 67
LIVE_DESTROY 70
LIVE_EXPORT 72
LIVE_IMAGE 75
LIVE_INFO 82
LIVE_LINE 94
LIVE_LOAD 98
LIVE_OPLOT 99
LIVE_PLOT 105
LIVE_PRINT 113
LIVE_RECT 115
LIVE_STYLE 119
LIVE_SURFACE 126
LIVE_TEXT 135

LJLCT 139
MSG_CAT_CLOSE 140
MSG_CAT_COMPILE 141
MSG_CAT_OPEN 143
PICKFILE 145
POLYFITW 146
REWIND 148
RIEMANN 149
RSTRPOS 154
SET_SYMBOL 156
SETLOG 157
SIZE Executive Command 159
SKIPF 161
SLICER 162
STR_SEP 168
TAPRD 170
TAPWRT 171
TIFF_DUMP 172
TIFF_READ 173
TIFF_WRITE 175
TRNLOG 177
VAX_FLOAT 179
WEOF 181
WIDED 182
WIDGET_MESSAGE 183

Chapter 3:
Obsolete Objects 185

IDLffLanguageCat 186
- IDLffLanguageCat Properties 187
- IDLffLanguageCat::IsValid 188
- IDLffLanguageCat::Query 189
- IDLffLanguageCat::SetCatalog 190

Chapter 4:
Routines with Obsolete Keywords 191

BYTEORDER 193

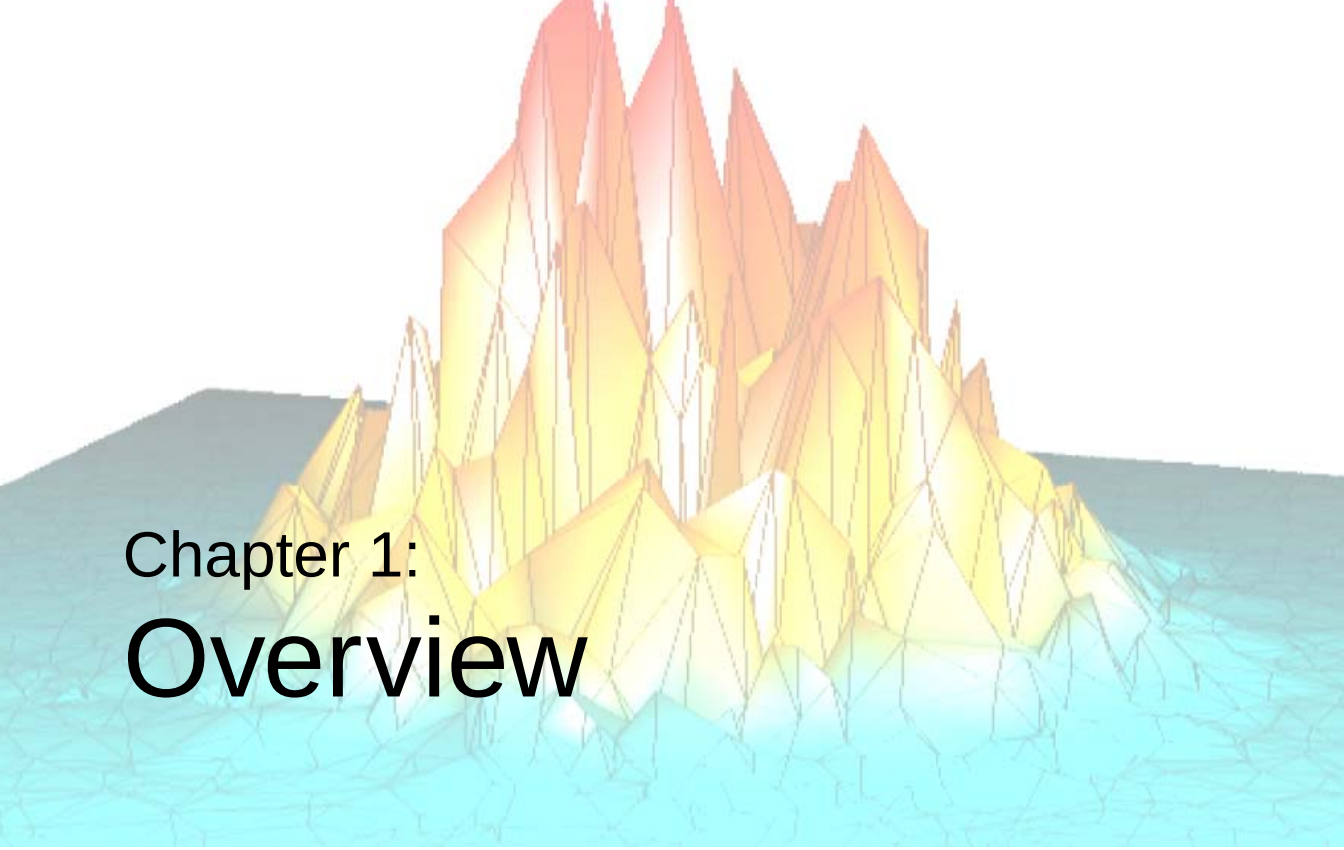
CALL_EXTERNAL 194
DEVICE 195
DOC_LIBRARY 196
EXTRACT_SLICE 197
IDLgrMPEG::Save 198
IDLgrVolume::Init 199
IDLITSYS_CREATETOOL 200
IDLitVisualization::Add 201
IDLitVisualization::GetCenterRotation 202
IDLitVisualization::GetProperty 203
IVolume 204
LINKIMAGE 205
LIVE_PRINT 206
MAKE_DLL 207
ONLINE_HELP 208
OPEN 209
PRINT/PRINTF 215
READ_TIFF 216
READ/READF 217
READU 218
SAVE 219
SPAWN 220
WIDGET_BASE 222
WRITE_TIFF 223
WRITEU 224
XMANAGER 225

Chapter 5:
Obsolete Graphics Devices 227

The LJ Device 228
- LJ Driver Strengths 229
- LJ Driver Limitations 229
- LJ Suggestions 230

The Macintosh Device 231

Chapter 6:
Remote Procedure Calls 233
Using IDL as an RPC Server 235
The IDL RPC Directory 235
Running IDL in Server Mode 235
Creating the IDL RPC Library 235
Linking your Client Program 236
The IDL RPC Library 237
free_idl_variable 238
get_idl_variable 239
idl_server_interactive 241
kill_server 242
register_idl_client 243
send_idl_command 244
set_idl_timeout 245
set_idl_variable 246
set_rpc_verbosity 248
unregister_idl_client 249
The varinfo_t Structure 250
Variable Creation Functions 250
v_make_byte 251
v_make_complex 252
v_make_dcomplex 253
v_make_double 254
v_make_float 255
v_make_int 256
v_make_long 257
v_make_string 258
v_fill_array 259
More Variable Manipulation Macros 260
Notes on Variable Creation and Memory Management 262
Freeing Resources 262
Creating a Statically-Allocated Array 262
Allocating Space for Strings 263
RPC Examples 264



Chapter 1: Overview

This chapter discusses the following topics:

Backwards Compatibility 10
Detecting Use of Obsolete Features 11
Documentation for Older Obsolete Routines . 12

Backwards Compatibility

RSI strongly recommends that you not use obsolete routines when writing new IDL code. As IDL continues to evolve, the likelihood that obsolete routines will no longer function as expected increases. While we will continue to make every effort to ensure that obsolete routines shipped with IDL function, in a small number of cases this may not be possible.

IDL Internal Routines

Routines that are built into the IDL executable—routines *not* written in the IDL language—will either continue to be included in the executable until the scheduled removal release or will be re-implemented in the IDL language. In the latter case, obsolete routines may run slower than the original version. Note that obsolete routines that have been re-implemented in the IDL language may also be scheduled for eventual removal.

Routines Written in IDL

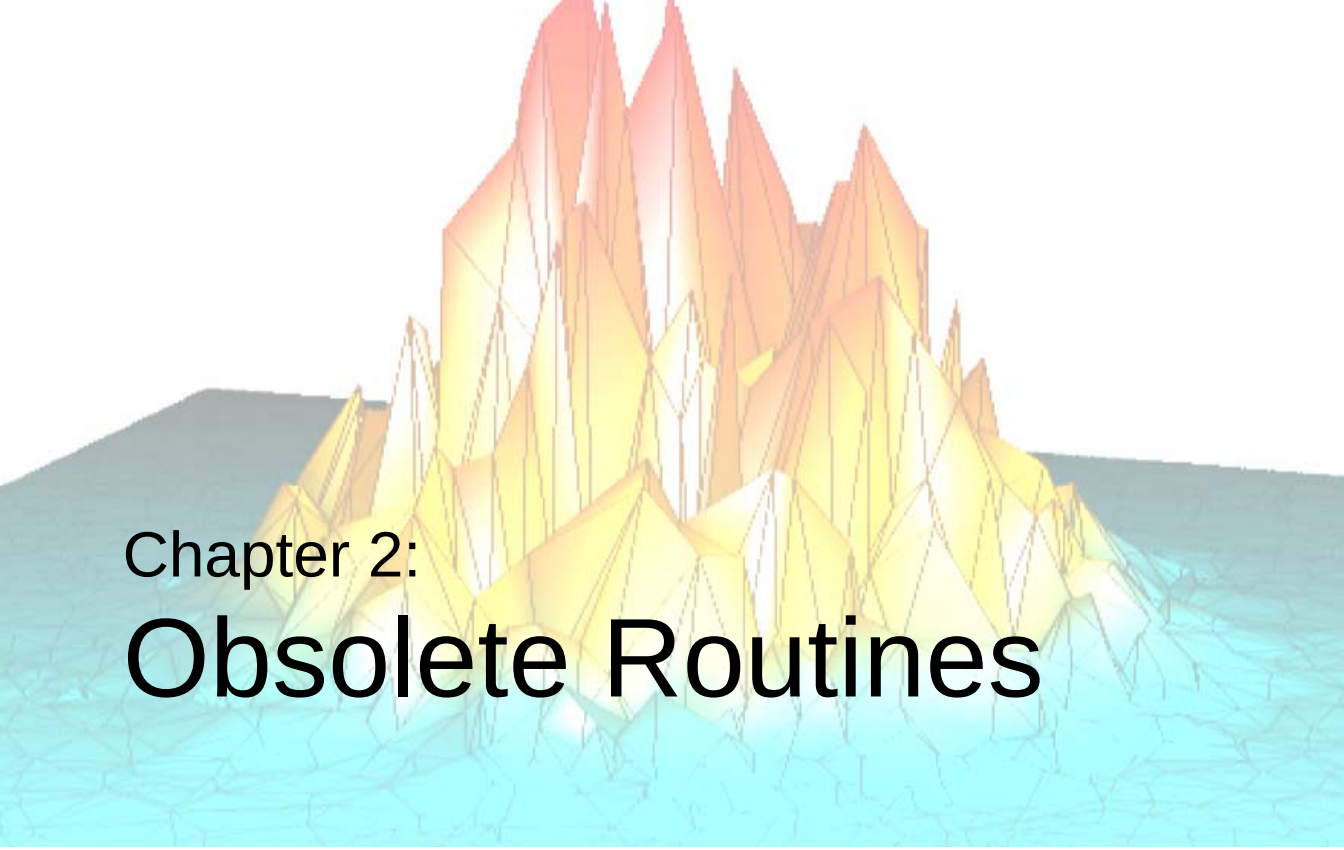
Routines written in the IDL language (`.pro` files) are contained in the obsolete subdirectory of the lib directory of the IDL distribution. As long as a given obsolete routine is included in this subdirectory, it will continue to function as always.

Detecting Use of Obsolete Features

You can search for usage of obsolete routines, system variables, and syntax by setting the fields of the !WARN system variable. Setting !WARN causes IDL to print informational messages to the command log or console window when it encounters references to obsolete features. See "!WARN" in the *IDL Reference Guide* manual for details.

Documentation for Older Obsolete Routines

Routines that became obsolete in IDL version 4.0 or earlier are not documented in this book or in the IDL Online Help. However, if the routine is written in the IDL language, you can inspect the documentation header of the `.pro` file, or use the DOC_LIBRARY routine. The `.pro` files for obsolete routines are located in the `obsolete` subdirectory of the `lib` directory of the IDL distribution.



Chapter 2: Obsolete Routines

This chapter contains complete documentation for obsoleted IDL routines. New IDL code should not use these routines. For a list of the routines that replace each of these obsolete routines, see Appendix I, “Obsolete Features” in the *IDL Reference Guide* manual.

DDE Routines

These routines are obsolete and should not be used in new IDL code.

Windows-Only Routines for Dynamic Data Exchange (DDE)

IDL for Windows supports DDE client capability for cold DDE links. The relevant system calls are documented below:

Result = DDE_GETSERVERS()

This function returns an array of service names for the currently-available DDE servers.

Result = DDE_GETTOPICS(*server*)

This function returns the topics list for the specified server. The server argument is a scalar string containing the name of the desired DDE server.

Result = DDE_GETITEMS(*server*)

This function returns the items list for the specified server. The server argument is a scalar string containing the name of the desired DDE server.

Result = DDE_REQUEST(*server*, *topic*, *item*)

This function returns the requested data in string format. The server, topic, and item arguments must be scalar strings.

DDE_EXECUTE, *server*, *topic*, *command*

This procedure causes the DDE server to execute the command for the specified topic. The server, topic, and command arguments must be scalar strings.

DELETE_SYMBOL

The DELETE_SYMBOL procedure deletes a DCL (Digital Command Language) interpreter symbol for the current process.

Note

This procedure is available on VMS only.

Syntax

DELETE_SYMBOL, *Name* [, TYPE={1 | 2}]

Arguments

Name

A scalar string containing the name of the symbol to be deleted.

Keywords

TYPE

Indicates the table from which *Name* will be deleted. Set TYPE to 1 to specify the local symbol table. Set TYPE to 2 to specify the global symbol table. The default is to search the local table.

DELLOG

The DELLOG procedure deletes a VMS logical name.

Note

This procedure is available on VMS only.

Syntax

DELLOG, *Lognam* [, TABLE=*string*]

Arguments

Lognam

A scalar string containing the name of the logical to be deleted.

Keywords

TABLE

A scalar string giving the name of the logical table from which to delete *Lognam*. If TABLE is not specified, LNM$PROCESS_TABLE is used.

DEMO_MODE

This routine is obsolete and should not be used in new IDL code.

The DEMO_MODE function returns True if IDL is running in the timed demo mode (i.e., a license manager is not running). Calling this function causes a FLUSH, -1 command to be issued.

Syntax

Result = DEMO_MODE()

DO_APPLE_SCRIPT

This routine is obsolete and should not be used in new IDL code.

The DO_APPLE_SCRIPT procedure compiles and executes an AppleScript script, possibly returning a result. DO_APPLE_SCRIPT is only available in IDL for Macintosh.

Syntax

DO_APPLE_SCRIPT, *Script* [, /AG_STRING] [, RESULT=*variable*]

Arguments

Script

A string or array of strings to be compiled and executed by AppleScript.

Keywords

AS_STRING

Set this keyword to cause the result to be returned as a decompiled string. Decompiled strings have the same format as the “The Result” window of Apple’s Script Editor.

RESULT

Set this keyword equal to a named variable that will contain the results of the script.

Example

Suppose you wish to retrieve a range of cell data from a Microsoft Excel spreadsheet. The following AppleScript script and command retrieve the first through fifth rows of the first two columns of a spreadsheet titled “Worksheet 1”, storing the result in the IDL variable A:

```
script = [ 'tell application "Microsoft Excel"', $
   'get Value of Range "R1C1:R5C2" of Worksheet 1', $
   'end tell' ]
DO_APPLE_SCRIPT, script, RESULT = a
```

Similarly, the following lines would copy the contents of the IDL variable A to a range within the spreadsheet:

```
A = [ 1, 2, 3, 4, 5 ]
script = [ 'tell application "IDL" to copy variable "A"', $
   'into aVariable', $
   'tell application "Excel" to copy aVariable to', $
   'value of range "R1C1:R5C1" of worksheet 1' ]
DO_APPLE_SCRIPT, script
```

ERRORF

This routine is obsolete and should not be used in new IDL code.

The ERRORF function returns the value of the error function:

$$erf(x) = 2/\sqrt{\pi}\int_0^x e^{-t^2}\,dt$$

The result is double-precision if the argument is double-precision. If the argument is floating-point, the result is floating-point. The result always has the same structure as *X*. The ERRORF function does not work with complex arguments.

Syntax

Result = ERRORF(*X*)

Arguments

X

The expression for which the error function is to be evaluated.

Example

To find the error function of 0.4 and print the result, enter:

```
PRINT, ERRORF(0.4)
```

IDL prints:

```
0.428392
```

FINDFILE

This routine is obsolete and should not be used in new IDL code.

The FINDFILE function retrieves a list of files that match *File_Specification*.

Note

RSI strongly recommends the use of the FILE_SEARCH function, included in IDL 5.5 and later, in place of the FINDFILE function. FILE_SEARCH offers many advantages over FINDFILE, including cross-platform consistency in wildcard syntax, uniform presentation of results, filtering by file attributes, and, under UNIX, freedom from performance and number of file limitations encountered by FINDFILE.

Platform specific differences are described below:

- Under UNIX, to include all the files in any subdirectories, use the * wildcard character in the *File_Specification*, such as in `result = FINDFILE('/path/*')`. If *File_Specification* contains only a directory, with no file information, only files in that directory are returned.
- Under Windows, FINDFILE appends a "\" character to the end of the returned file name if the file is a directory. To refer to all the files in a specific directory only, use `result = FINDFILE('\path\*')`.

Syntax

Result = FINDFILE(*File_Specification* [, COUNT=*variable*])

Return Value

All matched filenames are returned in a string array, one file name per array element. If no files exist with names matching the *File_Specification*, a null scalar string is returned instead of a string array. FINDFILE returns the full path only if the path itself is specified in *File_Specification*. See the "Examples" section below for details.

Arguments

File_Specification

A scalar string used to find files. The string can contain any valid command-interpreter wildcard characters. If *File_Specification* contains path information, that

path information is included in the returned value. If *File_Specification* is omitted, the names of all files in the current directory are returned.

Keywords

COUNT

A named variable into which the number of files found is placed. If no files are found, a value of 0 is returned.

Examples

To print the file names of all the UNIX files with `.dat` extensions in the current directory, use the command:

```
PRINT, FINDFILE('*.dat')
```

To print the full path names of all `.pro` files in the IDL `lib` directory that begin with the letter “x”, use the command:

```
PRINT, FINDFILE('/usr/local/rsi/idl/lib/x*.pro')
```

To print the path names of all `.pro` files in the `profiles` subdirectory of the current directory (a relative path), use the command:

```
PRINT, FINDFILE('profiles/*.pro')
```

Note that the values returned are (like the *File_Specification*) relative path names. Use caution when comparing values against this type of relative path specification.

Version History

Introduced: Original

GETHELP

This routine is obsolete and should not be used in new IDL code.

The GETHELP function returns information on variables defined at the program level from which GETHELP is called. The function builds a string array that contains information that follows the format used by the IDL HELP command.

When called without an argument, GETHELP returns a string array that normally contains variable data that is in the same format as used by the IDL HELP procedure. The variables in this list are those defined for the routine (or program level) that called GETHELP. If there are no variables defined, or the specified variable does not exist, GETHELP returns a null string. Other information can be obtained by setting keywords.

Syntax

Result = GETHELP(*[Variable]*)

Arguments

Variable

A scalar string that contains the name of the variable from which to get information. If this argument is omitted, GETHELP returns an array of strings where each element contains information on a separate variable, one element for each defined variable.

Keywords

FULLSTRING

Normally a string that is longer than 45 chars is truncated and followed by “...” just like the HELP command. Setting this keyword will cause the full string to be returned.

FUNCTIONS

Setting this keyword will cause the function to return all current IDL compiled functions.

ONELINE

If a variable name is greater than 15 characters it is usually returned as 2 two elements of the output array (Variable name in 1st element, variable info in the 2nd element). Setting this keyword will put all the information in one string, separating the name and data with a space.

PROCEDURES

Setting this keyword will cause the function to return all current IDL compiled procedures.

SYS_PROCS

Setting this keyword will cause the function to return the names of all IDL system (built-in) procedures.

SYS_FUNCS

Setting this keyword will cause the function to return the names of all IDL system (built-in) functions.

Note

RESTRICTIONS: Due to the difficulties in determining if a variable is of type associate, the following conditions will result in the variable being listed as a structure. These conditions are:

- Associate record type is structure.
- Associated file is opened for update (openu).
- Associate file is not empty.

Another difference between this routine and the IDL help command is that if a variable is in a common block, the common block name is not listed next to the variable name. Currently there is no method available to get the common block names used in a routine.

Example

To obtain a listing in a help format of the variables contained in the current routine you would make the following call:

HelpData = GetHelp()

The variable HelpData would be a string array containing the requested information.

GET_SYMBOL

This routine is obsolete and should not be used in new IDL code.

The GET_SYMBOL function returns the value of a VMS DCL (Digital Command Language) interpreter symbol as a scalar string. If the symbol is undefined, the null string is returned.

Note

This procedure is available on VMS only.

Syntax

Result = GET_SYMBOL(*Name* [, TYPE={1 | 2}])

Arguments

Name

A scalar string containing the name of the symbol to be translated.

Keywords

TYPE

The table from which *Name* is translated. Set TYPE to 1 to specify the local symbol table. A value of 2 specifies the global symbol table. The default is to search the local table.

HANDLE_CREATE

This routine is obsolete and should not be used in new IDL code.

The HANDLE_CREATE function creates a new handle. A “handle” is a dynamically-allocated variable that is identified by a unique integer value known as a “handle ID”. Handles can have a value, of any IDL data type and organization, associated with them. This function returns the handle ID of the newly-created handle.

Because handles are dynamic, they can be used to create complex data structures. They are also global in scope, but do not suffer from the limitations of COMMON blocks. That is, handles are available to all program units at all times. (Remember, however, that IDL variables containing handle IDs are not global in scope and must be declared in a COMMON block if you want to share them between program units.)

Handle Terminology

The following terms are used to describe handles in the documentation for this function and other handle-related routines:

- Handle ID: The unique integer identifier associated with a handle.
- Handle value: Data of any IDL type and organization associated with a handle.
- Top-level handle: A handle at the top of a handle hierarchy. A top-level handle can have children, but does not have a parent.
- Parents, children, and siblings: These terms describe the relationship between handles in a handle hierarchy. When a new handle is created, it can be the start of a new handle hierarchy (a top-level handle) or it can belong to the level of a handle hierarchy below an existing handle. A handle created in this way is said to be a child of the specified parent. Parents can have any number of children. All handles that share the same parent are said to be siblings.

Syntax

Result = HANDLE_CREATE(*[ID]*)

Arguments

ID

If this argument is present, it specifies the handle ID relative to which the new handle is created. Normally, the new handle becomes the last child of the parent handle specified by ID. However, this behavior can be changed by setting the FIRST_CHILD or SIBLING keywords.

Omit this argument to create a new top-level handle without a parent.

Keywords

FIRST_CHILD

Set this keyword to create the new handle as the first child of the handle specified by ID. Any existing children of ID become later siblings of the new first child (i.e., the existing first child becomes the second child, the second child becomes the third child, etc.).

NO_COPY

Usually, when the VALUE keyword is used, the source variable memory is copied to the handle value. If the NO_COPY keyword is set, the value data is taken away from the source variable and attached directly to the destination. This feature can be used to move data very efficiently. However, it has the side effect of causing the source variable to become undefined.

SIBLING

Set this keyword to create the new handle as the sibling handle immediately following ID. Any other siblings currently following ID become later siblings of the new handle. Note that you cannot create a handle that is a sibling of a top-level handle.

VALUE

The value to be assigned to the handle.

Every handle can contain a user-specified value of any data type and organization. This value is not used by the handle in any way, but exists entirely for the convenience of the IDL programmer. Use this keyword to set the handle value when the handle is first created.

If the VALUE keyword is not specified, the handle’s initial value is undefined.

Handle values can be retrieved using the HANDLE_VALUE procedure.

Examples

The following commands create a top-level handle with 3 child handles. Each handle is assigned a different string value:

```
;Create top-level handle without an initial handle value:
top = HANDLE_CREATE()
;Create first child of the top-level handle:
first = HANDLE_CREATE(top, VALUE='First child')
;Create second child of the top-level handle:
second = HANDLE_CREATE(top, VALUE='Second child')
;Create a new sibling between first and second.
;This handle is also a child of the top-level handle:
third = HANDLE_CREATE(first, VALUE='Another child', /SIBLING)
```

HANDLE_FREE

This routine is obsolete and should not be used in new IDL code.

The HANDLE_FREE procedure frees an existing handle, along with any dynamic memory currently being used by its value. Any child handles associated with ID are also freed.

Syntax

HANDLE_FREE, *ID*

Arguments

ID

The ID of the handle to be freed. Once the handle is freed, further use of it is invalid and causes an error to be issued.

Example

To free all memory associated with the top-level handle top, and all its children, use the command:

```
HANDLE_FREE, top
```

HANDLE_INFO

This routine is obsolete and should not be used in new IDL code.

The HANDLE_INFO function returns information about handle validity and connectivity. By default, it returns True if the specified handle ID is valid. Keywords can be set to return other types of information.

Syntax

Result = HANDLE_INFO(*ID*)

Arguments

ID

The ID of the handle for which information is desired. This argument can be scalar or array an array of IDs. The result of HANDLE_INFO has the same structure as ID, and each element gives the desired information for the corresponding element of ID.

Keywords

FIRST_CHILD

Set this keyword to return the handle ID of the first child of the specified handle. If the handle has no children, 0 is returned.

NUM_CHILDREN

Set this keyword to return the number of children related to ID.

PARENT

Set this keyword to return the handle ID of the parent of the specified handle. If the specified handle is a top-level handle (i.e., it has no parent), 0 is returned.

SIBLING

Set this keyword to return the handle ID of the sibling handle following ID. If ID has no later siblings, or if ID is a top-level handle, 0 is returned.

VALID_ID

Set this keyword to return 1 if ID represents a currently valid handle. Otherwise, zero is returned. This is the default action for HANDLE_INFO if no other keywords are specified.

Examples

The following commands demonstrate a number of different uses of HANDLE_INFO:

```
;Print a message if handle1 is a valid handle ID.
IF HANDLE_INFO(handle1) THEN PRINT, 'Valid handle.'
;Retrieve the handle ID of the first child of top.
handle = HANDLE_INFO(top, /FIRST_CHILD)
;Retrieve the handle ID of the next sibling of handle1.
next= HANDLE_INFO(handle1, /SIBLING)
```

HANDLE_MOVE

This routine is obsolete and should not be used in new IDL code.

The HANDLE_MOVE procedure moves a handle (specified by Move_ID) to a new location. This new position is specified relative to Static_ID.

Syntax

HANDLE_MOVE, *Static_ID*, *Move_ID*

Arguments

Static_ID

The handle ID relative to which the handle specified by Move_ID is moved. By default, Move_ID becomes the last child of Static_ID. This behavior can be changed by specifying one of the keywords described below.

If Static_ID is set to 0, Move_ID becomes a top level handle without any parent. Static_ID cannot be a child of Move_ID.

Move_ID

The ID of the handle to be moved.

Keywords

FIRST_CHILD

Set this keyword to make Move_ID the first child of Static_ID. Any existing children of Static_ID become later siblings of the new first child (i.e., the existing first child becomes the second child, the second child becomes the third child, etc.).

SIBLING

Set this keyword to make Move_ID the sibling handle immediately following Static_ID. Any siblings currently following Static_ID become later siblings of the new handle. Note that you cannot move a handle such that is becomes a sibling of a top-level handle.

Example

```
; Create top-level handle:
top = HANDLE_CREATE()
; Create first child of top:
child1 = HANDLE_CREATE(top)
; Create second child of top:
child2 = HANDLE_CREATE(top)
; Move the first child to be the last child of top:
HANDLE_MOVE, top, child1
```

HANDLE_VALUE

This routine is obsolete and should not be used in new IDL code.

The HANDLE_VALUE procedure returns or sets the value of an existing handle.

Syntax

HANDLE_VALUE, *ID*, *Value*

Arguments

ID

A valid handle ID.

Value

When using HANDLE_VALUE to return an existing handle value (the default), Value is a named variable in which the value is returned.

When using HANDLE_VALUE to set a handle value, Value is the new value. Note that handle values can have any IDL data type and organization.

Keywords

NO_COPY

By default, HANDLE_VALUE works by making a second copy of the source data. Although this technique is fine for small data, it can have a significant memory cost when the data being copied is large.

If the NO_COPY keyword is set, HANDLE_VALUE works differently. Rather than copy the source data, it takes the data away from the source and attaches it directly to the destination. This feature can be used to move data very efficiently. However, it has the side effect of causing the source variable to become undefined. On a retrieve operation, the handle value becomes undefined. On a set operation, the variable passed as Value becomes undefined.

SET

Set this keyword to assign Value as the new handle value. The default is to retrieve the current handle value.

Example

The following commands demonstrate the two different uses of HANDLE_VALUE:

```
; Retrieve the value of handle1 into the variable current:
HANDLE_VALUE, handle1, current
; Set the value of handle1 to a 2-element integer vector:
HANDLE_VALUE,handle1,[2,3],/SET
```

HDF_DFSD_ADDDATA

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_ADDDATA procedure writes data, as well as all other information set via calls to HDF_DFSD_SETINFO and HDF_DFSD_DIMSET, to an HDF file.

The *Data* array must have the same dimensions as the array in the file. The new SDS is appended to the file, unless the OVERWRITE keyword is set.

Syntax

HDF_DFSD_ADDDATA, *Filename*, *Data* [, /OVERWRITE]
[, SET_DIM=*value*{must set either this or the DIMS keyword to HDF_DFSD_SETINFO}] [, /SET_TYPE]

Arguments

Filename

A scalar string containing the name of the file to be written.

Data

An expression (typically an array) containing the data to write.

Keywords

OVERWRITE

Set this keyword to write Data as the first, and only, SDS in the file. All previously-written scientific data sets in the file are removed.

SET_DIM

Set this keyword to make the dimension information for the HDF file based upon the dimensions of Data.

Note

You *must* set the number of dimensions in the HDF file, either by setting the SET_DIM keyword or using the DIMS keyword to HDF_DFSD_SETINFO.

SET_TYPE

Set this keyword to make the data type of the current SDS based on the data type of the Data argument.

HDF_DFSD_DIMGET

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_DIMGET procedure retrieves information about the specified dimension number of the current HDF file.

Syntax

HDF_DFSD_DIMGET, *Dimension* [, /FORMAT] [, /LABEL] [, SCALE=*vector*] [, /UNIT]

Arguments

Dimension

The dimension number [0, 1, 2, ...] to get information about.

Keywords

FORMAT

Set this keyword to return the dimension format string.

LABEL

Set this keyword to return the dimension label string.

SCALE

Use this keyword to return scale information about the dimension. Set this keyword to a vector of values of the same type as the data.

UNIT

Set this keyword to return the dimension unit string.

HDF_DFSD_DIMSET

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_DIMSET procedure sets the label, unit, format, or scale of dimensions in an HDF. Note that the label, unit, and format of a dataset must be set simultaneously.

Syntax

HDF_DFSD_DIMSET, *Dimension* [, FORMAT=*string*] [, LABEL=*string*] [, SCALE=*vector*] [, UNIT=*string*]

Arguments

Dimension

The dimension number that the label, unit, format or scale apply to.

Keywords

FORMAT

A string for the dimension format. This string should be a standard IDL formatting string.

LABEL

A string for the dimension label.

SCALE

A vector of values used to set the dimension scale.

UNIT

A string for the dimension units.

Example

Suppose that a stored dataset is a 20 by 100 by 50 element floating-point array of values representing water content within the volume of a cloud. Assume further that each element in the 100-element dimension (the “Y” dimension) was sampled at 1/10

mile increments. Appropriate labeling, formatting, unit, and scaling information for the Y dimension can be set with the following command:

```
HDF_DFSD_DIMSET, 1, LABEL = 'Y Position', FORMAT = 'F8.2', $
   UNIT = 'Miles', SCALE = 0.1*FINDGEN(100)
```

HDF_DFSD_ENDSLICE

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_ENDSLICE procedure ends a sequence of calls started by HDF_DFSD_STARTSLICE by closing the internal slice interface and synchronizing the file.

Syntax

HDF_DFSD_ENDSLICE

Example

See the example in the documentation for HDF_DFSD_STARTSLICE.

HDF_DFSD_GETDATA

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_GETDATA procedure reads data from an HDF file.

Syntax

HDF_DFSD_GETDATA, *Filename*, *Data* [, /GET_DIMS{Set only if you have not called HDF_DFSD_GETINFO with the DIMS keyword}] [, /GET_TYPE]

Arguments

Filename

A scalar string containing the name of the file to be read.

Data

A named variable in which the data is returned.

Keywords

GET_DIMS

Set this keyword to get dimension information for reading the data. This keyword should only be used if one has *not* called HDF_DFSD_GETINFO with the DIMS keyword

GET_TYPE

Set this keyword to get the data type for the current SDS.

HDF_DFSD_GETINFO

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_GETINFO procedure retrieves information about the current HDF file.

Note that calling HDF_DFSD_GETINFO with the DIMS or TYPE keywords may alter which dataset is current. See “Reading an Entire Scientific Dataset” and “Getting Other Information About SDSs” in the *NCSA HDF Calling Interfaces and Utilities* documentation.

Note that reading a label, unit, format, or coordinate system string that has more than 256 characters can have unpredictable results.

Syntax

HDF_DFSD_GETINFO, *Filename* [, CALDATA=*variable*] [, /COORDSYS] [, DIMS=*variable*] [, /FORMAT] [, /LABEL] [, /LASTREF] [, /NSDS] [, /RANGE] [, TYPE=*variable*] [, /UNIT]

Arguments

Filename

A scalar string containing the name of the file to be read. A filename is only needed to determine SDS dimensions and/or the number of SDSs in a file.

Keywords

CALDATA

Set this keyword to a named variable which will contain the calibration data associated with an SDS data set. The data will be returned in a structure of the form:

```
{ CAL: 0d, CAL_ERR: 0d, OFFSET: 0d, $
  OFFSET_ERR: 0d,NUM_TYPE: 0L }
```

COORDSYS

Set this keyword to return the data coordinate system description string.

DIMS

Set this keyword to a named variable in which the dimensions of the current SDS are returned in a longword array.

FORMAT

Set this keyword to return the data format description string.

LABEL

Set this keyword to return the data label description string.

LASTREF

Set this keyword to return the last reference number written or read for an SDS.

NSDS

Set this keyword to return the number of SDSs in the file.

RANGE

Set this keyword to return the valid max/min values for the current SDS.

TYPE

Set this keyword to a named variable which returns a string describing the type of the current SDS (e.g., 'BYTE', 'FLOAT', etc.).

UNIT

Set this keyword to return the data unit description string.

Example

The following commands read an SDS, including information about its dimensions but not its annotations:

```
HDF_DFSD_GETINFO, filename, DIMS=d, TYPE=t, RANGE=r, $
   LABEL=l, UNIT=u, FORMAT=f, COORDSYS=c
...
FOR i = 0, N_ELEMENTS(d)-1 DO BEGIN
   HDF_DFSD_DIMGET, i, LABEL=dl, UNIT=du, FORMAT=df, SCALE=ds
ENDFOR
HDF_DFSD_GETDATA, filename, data
```

HDF_DFSD_GETSLICE

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_GETSLICE procedure reads a slice of data from the current Hierarchical Data Format file.

Note

Before calling HDF_DFSD_GETSLICE, call HDF_DFSD_GETINFO with the DIMS and TYPE keywords to get the dimensions and type of the next data slice. Failure to get the dimensions and type will cause the HDF interface to attempt to read the data incorrectly, and may cause unexpected results.

Syntax

HDF_DFSD_GETSLICE, *Filename*, *Data* [, COUNT=*vector*] [, OFFSET=*vector*]

Arguments

Filename

A scalar string containing the name of the file to be read.

Data

A named variable in which the data, read from the SDS, is returned.

Keywords

COUNT

An optional vector containing the counts to be used in reading Value. The default is to read all elements in each record taking the value of OFFSET into account.

OFFSET

A vector specifying the array indices within the specified record at which to begin reading. OFFSET is a 1-dimensional array containing one element per HDF dimension. The default value is zero for each dimension.

Example

See the example in the documentation for HDF_DFSD_STARTSLICE.

HDF_DFSD_PUTSLICE

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_PUTSLICE procedure writes a data slice to the current HDF file.

Note

Before calling HDF_DFSD_PUTSLIDCE, call HDF_DFSD_SETINFO to set the dimensions and attributes of the slice and HDF_DFSD_STARTSLICE to initialize the slice interface.

Syntax

HDF_DFSD_PUTSLICE, *Data* [, COUNT=*vector*]

Arguments

Data

An array containing the data to write. Dimensions used to write the data are taken from the dimensions of *Data*, unless the COUNT keyword is used.

Keywords

COUNT

An optional vector containing the counts to be used in writing *Data*. The counts do have to match the dimensions (number or sizes), but the count cannot describe more elements than exist.

Example

See the example in the documentation for HDF_DFSD_STARTSLICE.

HDF_DFSD_READREF

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_READREF procedure specifies the reference number of the HDF file to be read by the next call to HDF_DFSD_GETINFO or HDF_DFSD_GETDATA.

Syntax

HDF_DFSD_READREF, *Filename, Refno*

Arguments

Filename

A scalar string containing the name of the file to be read.

Refno

The reference number of the desired SDS.

HDF_DFSD_SETINFO

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_SETINFO procedure controls information associated with an HDF file. Because of the manner in which the underlying HDF library was written, it is necessary to set the dimensions and data type of a scientific data set the first time that HDF_DFSD_SETINFO is called.

This procedure has many options, controlled by keywords. The order in which the keywords are specified is unimportant as the routine insures the order of operation for any given call to it. CLEAR and RESTART requests are performed first, followed by type and dimension setting, followed by length setting, followed by the remaining keyword requests.

If you are not writing any ancillary information, you can call HDF_DFSD_ADDDATA with the SET_TYPE and/or SET_DIMS keywords.

Data string lengths should be set before, or at the same time as, writing the corresponding data string. For example:

```
HDF_DFSD_SETINFO, LEN_FORMAT=10, FORMAT='12.3F'
```

or

```
HDF_DFSD_SETINFO, LEN_FORMAT=10
HDF_DFSD_SETINFO, FORMAT='12.3F'
```

Due to the underlying C routines, it is necessary to set all four data strings at the same time, or the unspecified strings are treated as ‘’ (null strings).

For example:

```
HDF_DFSD_SETINFO, LABEL = 'hi'
HDF_DFSD_SETINFO, UNIT = 'ergs'
```

is the same as:

```
HDF_DFSD_SETINFO, LABEL='hi', UNIT='', FORMAT='', COORDSYS=''
HDF_DFSD_SETINFO, LABEL='', UNIT='ergs', FORMAT='', COORDSYS=''
```

Syntax

HDF_DFSD_SETINFO [, CALDATA=*structure*] [, /CLEAR] [, COORDSYS=*string*] [, DIMS=*vector*] [, /BYTE | , /DOUBLE | , /FLOAT, | , /INT | , /LONG] [, FORMAT=*string*] [, LABEL=*string*] [, LEN_LABEL=*value*] [, LEN_UNIT=*value*] [, LEN_FORMAT=*value*] [, LEN_COORDSYS=*value*] [, RANGE=*[max, min]*] [, /RESTART] [, UNIT=*string*]

Arguments

None

Keywords

BYTE

Set this keyword to make the SDS data type DFNT_UINT8 (1-byte unsigned integer).

CALDATA

Set this keyword to a structure containing calibration information. The structure should contain five tags, the first four of which are double-precision floating-point, and fifth of which should be long integer. For example:

```
caldata = { Cal:          1.0d $ ; Calibration factor.
            Cal_Err:      0.1d $ ; Calibration error.
            Offset:       2.5d $ ; Uncalibrated offset.
            Offset_Err:   0.1d $ ; Uncalibrated offset error.
            Num_Type:     5L   $ ; Number type of uncalib.data.
```

Some typical values for the `Num_Type` field include:

For byte data:

```
3L     (DFNT_UCHAR8)
21L    (DFNT_UINT8)
```

For integer data:

```
22L    (DNFT_INT16)
```

For long-integer data:

```
24L    (DFNT_INT32)
```

For floating-point data:

```
5L     (DFNT_FLOAT32)
6L     (DFNT_FLOAT64)
```

There are other types, but they are not native to IDL. They can be found in the `hdf.h` header file for the HDF library.

CLEAR

Set this keyword to reset all possible set values to their default value.

COORDSYS

A string for the data coordinate system description.

DIMS

Set this keyword to a vector of dimensions to be used in writing the next SDS. For example:

```
HDF_DFSD_SETINFO, DIMS = [10, 20, 30]
```

DOUBLE

Set this keyword to make the SDS data type DFNT_FLOAT64 (8-byte floating point).

FLOAT

Set this keyword to make the SDS data type DFNT_FLOAT32 (4-byte floating point).

FORMAT

A string for the data format description.

INT

Set this keyword to make the SDS data type DFNT_INT16 (2-byte signed integer).

LABEL

A string for the data label description.

LEN_LABEL

The label string length (default is 255).

LEN_UNIT

The unit string length (default is 255).

LEN_FORMAT

The format string length (default is 255).

LEN_COORDSYS

The format coordinate system string length (default is 255).

LONG

Set this keyword to make the SDS data type DFNT_INT32 (4-byte signed integer).

RANGE

The minimum and maximum range, represented as a 2-element vector of the same data type as the data to be written. The first element is the maximum, the second is the minimum. For example:

```
HDF_DFSD_SETINFO, RANGE = [10,0]
```

RESTART

Set this keyword to make the get (HDF_DFSD_GETSLICE) routine read from the first SDS in the file.

UNIT

A string for the data unit description.

Example

Write a 100x50 array of longs:

```
data = LONARR(100, 50)
HDF_DFSD_SETINFO, /CLEAR, /LONG, DIMS=[100,50], $
   RANGE=[MAX(data), MIN(data)], $
   LABEL='pressure', UNIT='pascals', $
   FORMAT='F10.0'
```

HDF_DFSD_STARTSLICE

This routine is obsolete and should not be used in new IDL code.

The HDF_DFSD_STARTSLICE procedure prepares the system to write a slice of data to an HDF file. HDF_DFSD_SETINFO must be called before HDF_DFSD_STARTSLICE to set the dimensions and attributes of the slice.

This procedure must be called before calling HDF_DFSD_PUTSLICE, and must be terminated with a call to HDF_DFSD_ENDSLICE.

Syntax

HDF_DFSD_STARTSLICE, *Filename*

Arguments

Filename

A scalar string containing the name of the file to be written.

Example

```
; Open an HDF file:
fid=HDF_OPEN('test.hdf',/ALL)

; Create two datasets:
slicedata1=FINDGEN(5,10,15)
slicedata2=DINDGEN(4,5)

; Use HDF_DFSD_SETINFO to set the dimensions, then add
; the first slice:
HDF_DFSD_SETINFO,LABEL='label1', DIMS=[5,10,15], /FLOAT
HDF_DFSD_STARTSLICE,'test.hdf'
HDF_DFSD_PUTSLICE, slicedata1
HDF_DFSD_ENDSLICE

; Repeat the process for the second slice:
HDF_DFSD_SETINFO, LABEL='label2', DIMS=[4,5], /DOUBLE
HDF_DFSD_STARTSLICE,'test.hdf'
HDF_DFSD_PUTSLICE, slicedata2
HDF_DFSD_ENDSLICE
HDF_DFSD_SETINFO, /RESTART

; Use HDF_DFSD_GETINFO to advance slices and set slice
```

```
; attributes, then get the slices:
HDF_DFSD_GETINFO, name, DIMS=dims, TYPE=type
HDF_DFSD_GETSLICE, out1
HDF_DFSD_GETINFO, name, DIMS=dims, TYPE=type
HDF_DFSD_GETSLICE, out2

; Close the HDF file:
HDF_CLOSE('test.hdf')

;Check the first slice to see if everything worked:
IF TOTAL(out1 EQ slicedata1) EQ N_ELEMENTS(out1) THEN $
   PRINT, 'SLICE 1 WRITTEN/READ CORRECTLY' ELSE $
   PRINT, 'SLICE 1 WRITTEN/READ INCORRECTLY'
; Check the second slice to see if everything worked:
IF TOTAL(out2 EQ slicedata2) EQ N_ELEMENTS(out2) THEN $
   PRINT, 'SLICE 2 WRITTEN/READ CORRECTLY' ELSE $
   PRINT, 'SLICE 2 WRITTEN/READ INCORRECTLY'
```

IDL Output

```
SLICE 1 WRITTEN/READ CORRECTLY

SLICE 2 WRITTEN/READ CORRECTLY
```

HDF_VD_GETNEXT

The HDF_VD_GETNEXT function returns the reference number of the next object inside a VData in an HDF file. If Id is -1, the first item in the VData is returned, otherwise Id should be set to a reference number previously returned by HDF_VD_GETNEXT. HDF_VD_GETNEXT returns -1 if there was an error or there are no more objects after the one specified by Id.

Syntax

Result = HDF_VD_GETNEXT(*VData*, *Id*)

Arguments

VData

The VData handle returned by a previous call to HDF_VD_ATTACH.

Id

A VGroup or VData reference number obtained by a previous call to HDF_VG_GETNEXT or HDF_VD_GETNEXT. Alternatively, this value can be set to -1 to return the first item in the VData.

Version History

Introduced: 4.0

INP, INPW, OUTP, OUTPW

These routines are obsolete and should not be used in new IDL code.

Windows-Only Routines for Hardware Ports

You can address the hardware ports of your personal computer directly using the following routines. In each case, *Port* is specified using the hexadecimal address of the hardware port. For example, if serial port #1 of your PC is at address 3F8, you would use the following IDL commands to read that port:

```
paddr = '3F8'x
data = INPW(paddr)
```

Set `paddr` *to hexadecimal value.*
Read data.

Result = INP(Port, *[D_1 . . . D_N]*)

This function returns either one byte (if only the port number is specified) or an array (the dimensions of which are specified by D_1 . . . D_N) read from the specified hardware port. Port is the hardware port number. For example,

```
result = INP(paddr)
```

would read a single byte, and

```
result = INP(paddr, 2,4)
```

would read a two-element by four-element array.

Result = INPW(Port, *[D_1 . . . D_N]*)

This function returns either one 16-bit word, as an integer (if only the port number is specified), or an array (the dimensions of which are specified by D_1 . . . D_N) from the specified hardware port. Port is the hardware port number.

OUTP, Port, Value

This procedure writes either one byte or an array of bytes to the specified hardware port. Port is the hardware port number. *Value* is the byte value or array to be written.

OUTPW, Port, Value

This procedure writes either one 16-bit word or an array of words to the specified hardware port. Port is the hardware port number. *Value* is the integer value or array to be written.

LIVE_Tools

The LIVE tools allow you to create, modify, and export visualizations directly from the IDL command line. In many cases, you can modify your visualizations using the LIVE tools' graphical user interface directly without ever needing to return the IDL command line. In some cases, however, you may wish to alter your visualizations programmatically rather than using the graphical user interface. Several LIVE routines allow you to do this easily.

The process of using the LIVE tools begins with the creation of a LIVE window via one of the four main LIVE routines: LIVE_CONTOUR, LIVE_IMAGE, LIVE_PLOT, and LIVE_SURFACE. When you use one of these four routines at the IDL command line, you specify some data to be visualized and a LIVE window appears. You can modify many of the properties of the items in your visualization by double-clicking on the item to call up a Properties dialog.

If you find that the graphical user interface does not allow you to perform the operation you wish to perform — saving your visualization as an image file, say — you can use the auxiliary LIVE routines. These routines can be divided into two groups:

- *Overplotting and Annotation Routines* that allow you to add annotations to an existing LIVE window. These routines include LIVE_LINE, LIVE_OPLOT, LIVE_RECT, and LIVE_TEXT. (Lines, rectangles, and text can also be added to LIVE windows using the graphical user interface.)
- *Information and Control Routines* that allow you to get information about an existing LIVE window, alter its properties, or export visualizations. These routines include LIVE_CONTROL, LIVE_DESTROY, LIVE_EXPORT, LIVE_INFO, LIVE_PRINT, and LIVE_STYLE.

To use the auxiliary routines, you will need to know the *Name* of the LIVE window or item you wish to alter. To create an IDL variable containing the names of the elements of a LIVE window, set the REFERENCE_OUT keyword equal to a named variable when you first create your LIVE window. The returned variable will be a structure that contains the names of all of the elements in the visualization you have created. Use the contents of this structure to determine the value of the Name argument for the auxiliary LIVE tools, or to determine the name of the LIVE window you wish to alter.

Note

The LIVE tools do not utilize the !X, !Y, and !Z conventions. Setting these system variables will have no effect on LIVE tool display.

LIVE_CONTOUR

The LIVE_CONTOUR procedure displays contour visualizations in an interactive environment. Because the interactive environment requires extra system resources, this routine is most suitable for relatively small data sets. If you find that performance does not meet your expectations, consider using the Direct Graphics CONTOUR routine or the Object Graphics IDLgrContour class directly.

After LIVE_CONTOUR has been executed, you can double-click on a contour line to display a properties dialog. A set of buttons in the upper left corner of the window allows you to print, undo the last operation, redo the last “undone” operation, copy, draw a line, draw a rectangle, or add text.

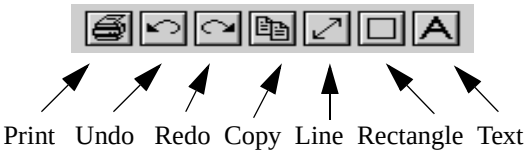


Figure 2-1: LIVE_CONTOUR Properties Dialog

You can control your LIVE window after it is created using any of several auxiliary routines. See “LIVE_Tools” on page 57 for an explanation.

Syntax

LIVE_CONTOUR [, Z_1,..., Z_{25}] [, /BUFFER] [, DIMENSIONS=*[width, height]*{normal units}] [, /DOUBLE] [, DRAW_DIMENSIONS=*[width, height]*{devive units}] [, ERROR=*variable*] [, /INDEXED_COLOR] [, INSTANCING={-1 | 0 | 1}] [, LOCATION=*[x, y]*{normal units}] [, /MANAGE_STYLE] [, NAME=*structure*] [, /NO_DRAW] [, /NO_SELECTION] [, /NO_STATUS] [, /NO_TOOLBAR] [, PARENT_BASE=*widget_id* | , TLB_LOCATION=*[Xoffset, Yoffset]*{device units}] [, PREFERENCE_FILE=*filename*{full path}] [, REFERENCE_OUT=*variable*] [, RENDERER={0 | 1}] [, REPLACE={*structure* | {0 | 1 | 2 | 3 | 4}}] [, STYLE=*name_or_reference*] [, TEMPLATE_FILE=*filename*] [, TITLE=*string*] [, WINDOW_IN=*string*] [, {X | Y}INDEPENDENT=*value*] [, {/X | /Y}LOG] [, {X | Y}RANGE=*[min, max]*{data units}] [, {X | Y}_TICKNAME=*array*]

Arguments

Zn

A vector of data. Up to 25 of these arguments may be specified. If any of the data is stored in IDL variables of type DOUBLE, LIVE_CONTOUR uses double-precision to store the data and to draw the result.

Keywords

BUFFER

Set this keyword to bypass the creation of a LIVE window and send the visualization to an offscreen buffer. The WINDOW field of the reference structure returned by the REFERENCE_OUT keyword will contain the name of the buffer.

DOUBLE

Set this keyword to force LIVE_CONTOUR to use double-precision to draw the result. This has the same effect as specifying data in the Zn argument using IDL variables of type DOUBLE.

DIMENSIONS

Set this keyword to a two-element, floating-point vector of the form [width, height] specifying the dimensions of the visualization in normalized coordinates. The default is [1.0, 1.0].

DRAW_DIMENSIONS

Set this keyword equal to a vector of the form [width, height] representing the desired size of the LIVE tools draw widget (in pixels). The default is [452, 452].

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

INDEXED_COLOR

If set, the indexed color mode will be used. The default is TrueColor.

INSTANCING

Set this keyword to 1 to instance drawing on, or 0 to turn it off. The default (-1) is to use instancing if and only if the “software renderer” is being used (see RENDERER). For more information, see “Instancing” in the *Objects and Object Graphics* manual.

LOCATION

Set this keyword to a two-element, floating-point vector of the form [X, Y] specifying the location of the visualization (relative to the lower left hand corner within the visualization window) in normalized coordinates. The default is [0.0, 0.0].

Note

LOCATION may be adjusted to take into account window decorations.

MANAGE_STYLE

Set this keyword to have the passed in style item destroyed when the LIVE tool window is destroyed. This keyword has no effect if the STYLE keyword is not set to a style item.

NAME

Set this keyword to a structure containing suggested names for the data items to be created for this visualization. See the REPLACE keyword for details on how they will be used. The fields of the structure are as follows. (Any or all tags may be set.)

Tag	Description
DATA	Dependent Data Name(s)
IX	Independent X Data Name
IY	Independent Y Data Name

Table 2-1: Fields of the NAME keyword

The default for a field is to use the given variable name. If the variable does not have a name (i.e., is an expression), a default name is automatically generated. The

dependent data names will be used in a round-robin fashion if more data than names are input.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing results of LIVE_CONTOUR. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

NO_STATUS

Set this keyword to prevent the creation of the status bar.

NO_TOOLBAR

Set this keyword to prevent the creation of the toolbar.

PARENT_BASE

Set this keyword to the widget ID of an existing base widget to bypass the creation of a LIVE window and create the visualization within the specified base widget.

Note

The location of the draw widget is not settable. It is expected that the user who wishes to insert a tool into their own widget application will determine the setting from the parent base sent to the tool.

Note

LIVE_DESTROY on a window is recommended when using PARENT_BASE so that proper memory cleanup is done. Simply destroying the parent base is not sufficient.

Note

When specifying a PARENT_BASE, that parent base must be running in a non-blocking mode. Putting a LIVE tool into a realized base already controlled by XMANAGER will override the XMANAGER mode to /NO_BLOCK even if blocking had been in effect.

REFERENCE_OUT

Set this keyword to a variable to return a structure defining the names of the created items. The fields of the structure are shown in the following table.

Tag	Description
WIN	Window Name
VIS	Visualization Name
XAXIS	X-Axis Name
YAXIS	Y-Axis Name
GRAPHIC	Graphic Name(s)
LEGEND	Legend Name
DATA	Dependent Data Name(s)
IX	Independent X Data Name
IY	Independent Y Data Name

Table 2-2: Fields of the LIVE_CONTOUR Reference Structure

Note

You can also determine the name of an item by opening its properties dialog and checking the “Name” field (or for Windows, by clicking the title bar).

RENDERER

Set this keyword to 1 to use the “software renderer”, or 0 to use the “hardware renderer”. The default (-1) is to use the setting in the IDE (IDL Development Environment) preferences; if the IDE is not running, however, the default is hardware rendering. For more information, see “Hardware vs. Software Rendering” in the *Objects and Object Graphics* manual.

REPLACE

Set this keyword to a structure containing tags as listed for the NAME keyword, with scalar values corresponding to the replacement options listed below. (Any or all of the tags may be set.) The replacement settings are used to determine what action to take

when an item (such as data) being input would have the same name as one already existing in the given window or buffer (WINDOW_IN).

Alternatively, this keyword may be set to a single scalar value, which is equivalent to setting each tag of the structure to that choice.

Setting	Action Taken
0	New items will be given unique names.
1	Existing items will be replaced by new items (i.e., the old items will be deleted and new ones created).
2	User will be prompted for the action to take.
3	The values of existing items will be replaced. This will cause dynamic updating to occur for any current uses, e.g., a visualization would redraw to show the new value.
4	Default. Option 0 will be used for items that do not have names (e.g., data input as an expression rather than a named variable, with no name provided via the NAME keyword). Option 3 will be used for all named items.

Table 2-3: REPLACE keyword Settings and Action Taken

STYLE

Set this keyword to either a string specifying a style name created using LIVE_STYLE.

TITLE

Set this keyword to a string specifying the title to give the main window. It must not already be in use. A default will be chosen if no title is specified.

TLB_LOCATION

Set this keyword to a two-element vector of the form [*Xoffset*, *Yoffset*] specifying the offset (in pixels) of the LIVE window from the upper left corner of the screen. This keyword has no effect if the PARENT_BASE keyword is set. The default is [0, 0].

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer, in which to display the visualization. The WIN tag of the

REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. The default is to create a new window.

XINDEPENDENT

Set this keyword to a vector specifying the X values for LIVE_CONTOUR. The default is the data's index values.

Note

Only one independent vector is allowed; all dependent vectors will use the independent vector.

YINDEPENDENT

Set this keyword to a vector specifying the Y values for LIVE_CONTOUR. The default is the data's index values.

Note

Only one independent vector is allowed; all dependent vectors will use the independent vector.

XLOG

Set this keyword to make the X axis a log axis. The default is 0 (linear axis).

YLOG

Set this keyword to make the Y axis a log axis. The default is 0 (linear axis).

XRANGE

Set this keyword equal to a two-element array that defines the minimum and maximum values of the X axis range. The default equals the values computed from the data range.

YRANGE

Set this keyword equal to a two-element array that defines the minimum and maximum values of the Y axis range. The default equals the values computed from the data range.

X_TICKNAME

Set this keyword equal to an array of strings to be used to label the tick mark for the X axis. The default equals the values computed from the data range.

Y_TICKNAME

Set this keyword equal to an array of strings to be used to label the tick mark for the Yaxis. The default equals the values computed from the data range.

Examples

```
; Create a dataset to display:
Z=DIST(10)

; Display the contour. To manipulate contour lines, click on the
; plot to access a graphical user interface.
LIVE_CONTOUR, Z
```

Note

This is a “Live” situation. When data of the same name is used multiple times within the same window, it always represents the same internal data item. For example, if one does the following:

```
Y=indgen(10)
LIVE_PLOT, Y, WINDOW_IN=w, DIMENSIONS=d, LOCATION=loc1
Y=indgen(20)
LIVE_PLOT, Y, WINDOW_IN=w, DIMENSIONS=d, LOCATION=loc2
```

The first plot will update to use the Y of the second plot when the second plot is drawn. If the user wants to display 2 “tweaks” of the same data, a different variable name must be used each time, or at least one should be an expression (thus not a named variable). For example:

```
LIVE_PLOT, Y1,...
LIVE_PLOT, Y2,...
```

or;

```
LIVE_PLOT, Y,...
LIVE_PLOT, myFunc(Y),...
```

In last example, the data of the second visualization will be given a default unique name since an expression rather than a named variable is input.

Note

The above shows the default behavior for naming and replacing data, which can be overridden using the NAME and REPLACE keywords.

Version History

Introduced: 5.0

See Also

CONTOUR

LIVE_CONTROL

The LIVE_CONTROL procedure allows you to set the properties of (or elements within) a visualization in a LIVE tool from the IDL command line. See "LIVE_Tools" on page 57 for additional discussion of the routines that control the LIVE_ tools.

Note

The LIVE tools do not utilize the !X, !Y, and !Z conventions. Setting these system variables will have no effect on LIVE tool display.

Syntax

LIVE_CONTROL, [*Name*] [, /DIALOG] [, ERROR=*variable*] [, /NO_DRAW] [, PROPERTIES=*structure*] [, /SELECT] [, /UPDATE_DATA] [, WINDOW_IN=*string*]

Arguments

Name

If keywords DIALOG and/or PROPERTIES are used, *Name* is a string (case-insensitive) containing the name of a window visualization or graphic to operate on. WINDOW_IN will default to the window or buffer, if only one is present in the IDL session.

If keyword UPDATE_DATA is used, *Name* must be an IDL variable with the same name as one already used in the given window or buffer (WINDOW_IN). In this case there is no default. If UPDATE_DATA is not set, the parameter must be a name of a window, visualization or visualization element.

Keywords

DIALOG

Set this keyword to have the editable properties dialog of the visualization or graphic appear.

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

PROPERTIES

Set this keyword to a properties structure with which to modify the given visualization or graphic. The structure should contain one or more tags as returned from a LIVE_INFO call on the same type of item.

UPDATE_DATA

Set this keyword to force the window to update all of its visualizations that contain the given data passed in the parameter to LIVE_CONTROL.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

Examples

```
; Create a dataset to display:
X=indgen(10)

; Plot the dataset:
LIVE_PLOT, X
```

```
; Modify the dataset:
X=X+2

; Replace old values of X:
LIVE_CONTROL, X, /UPDATE_DATA
```

Version History

Introduced: 5.1

See Also

LIVE_INFO, LIVE_STYLE

LIVE_DESTROY

The LIVE_DESTROY procedure allows you to destroy a window visualization or an element in a visualization.

Syntax

LIVE_DESTROY, [$Name_1$,..., $Name_{25}$] [, /ENVIRONMENT] [, ERROR=*variable*] [, /NO_DRAW] [, /PURGE] [, WINDOW_IN=*string*]

Arguments

Name

A string containing the name of a valid LIVE visualization or element. If a visualization is supplied, all components in the visualization will be destroyed. Up to 25 components may be specified in a single call. If not specified, the entire window or buffer (WINDOW_IN) and its contents will be destroyed.

Warning

Using WIDGET_CONTROL to destroy the parent base of a LIVE tool before using LIVE_DESTROY to clean up will leave hanging object references.

Keywords

ENVIRONMENT

Destroys the LIVE_ Tools environment (background processes).

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

PURGE

Destroys LIVE_ Tools (use this keyword for cleaning up the system after fatal errors in LIVE_ Tools). This keyword may cause the loss of data if not used correctly.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

Examples

```
LIVE_DESTROY, 'Line Plot Visualization'

; Destroy window (if only one window present):
LIVE_DESTROY
```

Version History

Introduced: 5.1

LIVE_EXPORT

The LIVE_EXPORT procedure allows the user to export a given visualization or window to an image file.

Syntax

LIVE_EXPORT [, /APPEND] [, COMPRESSION={0 | 1 | 2}{TIFF only}] [, /DIALOG] [, DIMENSIONS=*[width, height]*] [, ERROR=*variable*] [, FILENAME=*string*] [, ORDER={0 | 1}{JPEG or TIFF}] [, /PROGRESSIVE{JPEG only}] [, QUALITY={0 | 1 | 2}{for VRML} | {0 to 100}{for JPEG}] [, RESOLUTION=*value*] [, TYPE={'BMP' | 'JPG' | 'PIC' | 'SRF' | 'TIF' | 'XWD' | 'VRML'}] [, UNITS={0 | 1 | 2}] [, VISUALIZATION_IN=*string*] [, WINDOW_IN=*string*]

Arguments

None

Keywords

APPEND

Specifies that the image should be added to the existing file, creating a multi-image TIFF file.

COMPRESSION (TIFF)

Set this keyword to select the type of compression to be used:

- 0 = none (default)
- 2 = PackBits.

DIALOG

Set this keyword to have a dialog appear allowing the user to choose the image type and specifications.

DIMENSIONS

Set this keyword to a two-element vector of the form [width, height] to specify the dimensions of the image in units specified by the UNITS keyword. The default is [640, 480] pixels.

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

FILENAME

Set this keyword equal to a string specifying the desired name of the image file. The default is `live_export.extension`, where `extension` is one of the following:

```
bmp, jpg, jpeg, pic, pict, srf, tif, tiff, xwd, vrml
```

ORDER (JPEG, TIFF)

Set this keyword to have the image written from top to bottom. Default is bottom to top.

PROGRESSIVE (JPEG)

Set this keyword to write the image as a series of scans of increasing quality. When used with a slow communications link, a decoder can generate a low-quality image very quickly, and then improve its quality as more scans are received.

QUALITY (JPEG, VRML)

This keyword specifies the quality index of VRML images and JPEG images. For VRML, the values are 0=Low, 1=Medium, 2=High. For JPEG the range is 0 ("terrible") to 100 ("excellent"). This keyword has no effect on non-JPEG or non-VRML images.

RESOLUTION

Set this keyword to a floating-point value specifying the device resolution in centimeters per pixel. The default is 72 DPI=2.54 (cm/in)/ 0.0352778 (cm/pixel).

Note

It is important to match the eventual output device's resolution so that text is scaled properly.

TYPE

Set this keyword equal to a string specifying the image type to write. Valid strings are: 'BMP', 'JPG', 'JPEG' (default), 'PIC', 'PICT', 'SRF', 'TIF', 'TIFF', 'XWD', and 'VRML'.

UNITS

Set this keyword to indicate the units of measure for the DIMENSIONS keyword. Valid values are 0=Device (default), 1=Inches, 2=Centimeters.

VISUALIZATION_IN

Set this keyword equal to the name (string, case-insensitive) of a LIVE tool visualization to export. The VIS field from the REFERENCE_OUT keyword from the creation of the LIVE tool will provide the visualization name. If VISUALIZATION_IN is not specified, the whole window or buffer (WINDOW_IN) will be exported.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer, to export. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

Examples

```
LIVE_EXPORT, WINDOW_IN='Live Plot 2'
```

Version History

Introduced: 5.1

LIVE_IMAGE

The LIVE_IMAGE procedure displays visualizations in an interactive environment. Double-click on the image to display a properties dialog. A set of buttons in the upper left corner of the image window allows you to print, undo the last operation, redo the last “undone” operation, copy, draw a line, draw a rectangle, or add text.

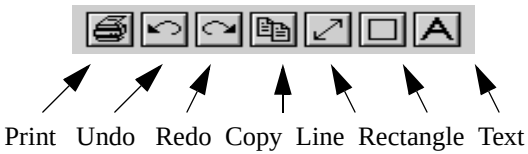


Figure 2-2: LIVE_IMAGE Properties Dialog

You can control your LIVE window after it is created using any of several auxiliary routines. See “LIVE_Tools” on page 57 for an explanation.

Syntax

LIVE_IMAGE, *Image* [, RED=*byte_vector*] [, GREEN=*byte_vector*]
[, BLUE=*byte_vector*] [, /BUFFER] [, DIMENSIONS=*[width, height]*{normal units}] [, DRAW_DIMENSIONS=*[width, height]*{devive units}]
[, ERROR=*variable*] [, /INDEXED_COLOR] [, INSTANCING={-1 | 0 | 1}]
[, LOCATION=*[x, y]*{normal units}] [, /MANAGE_STYLE] [, NAME=*structure*]
[, /NO_DRAW] [, /NO_SELECTION] [, /NO_STATUS] [, /NO_TOOLBAR]
[, PARENT_BASE=*widget_id* | , TLB_LOCATION=*[Xoffset, Yoffset]*{device units}]
[, PREFERENCE_FILE=*filename*{full path}] [, REFERENCE_OUT=*variable*]
[, RENDERER={0 | 1}] [, REPLACE={*structure* | {0 | 1 | 2 | 3 | 4}}]
[, STYLE=*name_or_reference*] [, TEMPLATE_FILE=*filename*] [, TITLE=*string*]
[, WINDOW_IN=*string*]

Arguments

Image

A two- or three-dimensional array of image data. The three-dimensional array must be for the form [3,X,Y] or [X,3,Y] or [X,Y,3].

Keywords

BLUE

Set this keyword equal to a byte vector of blue values.

Note

The BLUE, GREEN, and RED keywords are only used for 2D image data. They are used to form the color table. The 2D array is a set of values that are just indexes into this table.

BUFFER

Set this keyword to bypass the creation of a LIVE window and send the visualization to an offscreen buffer. The WINDOW field of the reference structure returned by the REFERENCE_OUT keyword will contain the name of the buffer.

DIMENSIONS

Set this keyword to a two-element vector of the form [width, height] to specify the dimensions of the image in units specified by the UNITS keyword. The default is [1.0, 1.0].

DRAW_DIMENSIONS

Set this keyword to a two-element vector of the form [width, height] to specify the size of the LIVE tools draw widget (in pixels). The default is [452, 452].

Note

This default value may be different depending on previous template projects.

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

GREEN

Set this keyword equal to a byte vector of green values.

Note

The BLUE, GREEN, and RED keywords are only used for 2D image data. They are used to form the color table. The 2D array is a set of values that are just indexes into this table.

INDEXED_COLOR

If set, the indexed color mode will be used. The default is TrueColor. (See *Using IDL* for more information on color modes.)

INSTANCING

Set this keyword to 1 to instance drawing on, or 0 to turn it off. The default (-1) is to use instancing if and only if the “software renderer” is being used (see RENDERER). For more information, see “Instancing” in the *Objects and Object Graphics* manual.

LOCATION

Set this keyword to a two-element, floating-point vector of the form [X, Y] specifying the location of the visualization (relative to the lower left hand corner within the visualization window) in normalized coordinates. The default is [0.0, 0.0].

Note

LOCATION may be adjusted to take into account window decorations.

MANAGE_STYLE

Set this keyword to have the passed in style item destroyed when the LIVE tool window is destroyed. This keyword will have no effect if the STYLE keyword is not set to a style item.

NAME

Set this keyword to a structure containing suggested names for the items to be created for this visualization. See the REPLACE keyword for details on how they will be used. The fields of the structure are as follows. (Any or all of the tags may be set.)

Tag	Description
DATA	Dependent Data Name(s)
CT	Color Table Name

Table 2-4: Fields of the NAME keyword

The default for a field is to use the given variable name. If the variable does not have a name (i.e., is an expression), a default name is automatically generated.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing results of LIVE_CONTOUR. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

NO_STATUS

Set this keyword to prevent the creation of the status bar.

NO_TOOLBAR

Set this keyword to prevent the creation of the toolbar.

PARENT_BASE

Set this keyword to the widget ID of an existing base widget to bypass the creation of a LIVE window and create the visualization within the specified base widget.

Note

The location of the draw widget is not settable. It is expected that the user who wishes to insert a tool into their own widget application will determine the setting from the parent base sent to the tool.

Note

LIVE_DESTROY on a window is recommended when using PARENT_BASE so that proper memory cleanup is done. Simply destroying the parent base is not sufficient.

Note

When specifying a PARENT_BASE, that parent base must be running in a non-blocking mode. Putting a LIVE tool into a realized base already controlled by XMANAGER will override the XMANAGER mode to /NO_BLOCK even if blocking had been in effect.

RED

Set this keyword equal to a byte vector of red values.

Note

The BLUE, GREEN, and RED keywords are only used for 2D image data. They are used to form the color table. The 2D array is a set of values that are just indexes into this table.

REFERENCE_OUT

Set this keyword to a variable to return a structure defining the names of the created items. The fields of the structure are shown in the following table. Note that the COLORBAR* field does not show up with TrueColor images:

Tag	Description
WIN	Window Name
VIS	Visualization Name
GRAPHIC	Graphic Name
CT	Color Table Name
COLORBAR*	Colorbar Name
DATA	Data Name

Table 2-5: Fields of the LIVE_IMAGE Reference Structure

RENDERER

Set this keyword to 1 to use the “software renderer”, or 0 to use the “hardware renderer”. The default (-1) is to use the setting in the IDE (IDL Development Environment) preferences; if the IDE is not running, however, the default is hardware rendering. For more information, see “Hardware vs. Software Rendering” in the *Objects and Object Graphics* manual.

REPLACE

Set this keyword to a structure containing tags as listed for the NAME keyword, with scalar values corresponding to the replacement options listed below. (Any or all of the tags may be set.) The replacement settings are used to determine what action to take when an item (such as data) being input would have the same name as one already existing in the given window or buffer (WINDOW_IN).

Setting	Action Taken
0	New items will be given unique names.
1	Existing items will be replaced by new items (i.e., the old items will be deleted and new ones created).
2	User will be prompted for the action to take.
3	The values of existing items will be replaced. This will cause dynamic updating to occur for any current uses, e.g., a visualization would redraw to show the new value.
4	Default. Option 0 will be used for items that do not have names (e.g., data input as an expression rather than a named variable, with no name provided via the NAME keyword). Option 3 will be used for all named items.

Table 2-6: REPLACE keyword Settings and Action Taken

STYLE

Set this keyword to either a string specifying a style name created using LIVE_STYLE.

TITLE

Set this keyword to a string specifying the title to give the main window. It must not already be in use. A default will be chosen if no title is specified.

TLB_LOCATION

Set this keyword to a two-element vector of the form [*Xoffset*, *Yoffset*] specifying the offset (in pixels) of the LIVE window from the upper left corner of the screen. This keyword has no effect if the PARENT_BASE keyword is set. The default is [0, 0].

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window, or a LIVE tool buffer, in which to display the visualization. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. The default is to create a new window.

Examples

```
LIVE_IMAGE, myImage
```

Version History

Introduced: 5.0

See Also

TV, TVSCL

LIVE_INFO

The LIVE_INFO procedure allows the user to get the properties of a LIVE tool.

Syntax

LIVE_INFO, [*Name*] [, ERROR=*variable*] [, PROPERTIES=*variable*] [, WINDOW_IN=*string*]

Arguments

Name

A string containing the name of a visualization or element (case-insensitive). The default is to use the window or buffer (WINDOW_IN).

Keywords

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

PROPERTIES

Set this keyword to a named variable to contain the returned properties structure. For a description of the structures, see Properties Structures below.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

Structure Tables for LIVE_INFO and LIVE CONTROL

The following tables describe the properties structures used by LIVE_INFO and LIVE_CONTROL (via the PROPERTIES keyword) for:

- Color Names
- Line Annotations
- Rectangle Annotations
- Text Annotations
- Axes
- Colorbars
- Images
- Legends
- Surfaces
- Entire Visualizations
- Windows

Color Names

The following color names are the possible values for color properties:

- Black
- Blue
- Light Gray
- Light Blue
- Red
- Magenta
- Brown
- Light Cyan
- Green
- Cyan
- Light Red
- Light Magenta
- Yellow
- Dark Gray
- Light Green
- White

Line Annotations

The fields in the properties structure of Line Annotations are as follows:

Tag	Description
thick	1 to 10 pixels

Table 2-7: Line Annotation Properties Structure

Tag	Description
arrow_start	1 = arrow head at line start, 0 = no arrowhead
arrow_end	1 = arrow head at line start, 0 = no arrowhead
arrow_size	0.0 to 0.3 normalized units
arrow_angle	1.0 to 179.0 degrees
linestyle	0=solid, 1=dotted, 2=dashed, 3=dash dot, 4=dash dot dot, 5=long dash
hide	1 = hidden, 0 = visible
name	scalar string (unique within all graphics)
color	see "Color Names" on page 83
location	[x, y] normalized units
dimensions	[width, height] normalized units
uvalue	any value of any type (only returned in structure if defined)

Table 2-7: Line Annotation Properties Structure (Continued)

Rectangle Annotations

The fields in the properties structure of Rectangle Annotations are as follows:

Tag	Description
thick	1 to 10 pixels
linestyle	0=solid, 1=dotted, 2=dashed, 3=dash dot, 4=dash dot dot, 5=long dash
hide	1=hidden, 0=visible
name	scalar string (unique within all graphics)
color	see "Color Names" on page 83
location	[x, y] normalized units
dimensions	[width, height] normalized units

Table 2-8: Rectangle Annotation Properties Structure

Tag	Description
uvalue	any value of any type (only returned in structure if defined)

Table 2-8: Rectangle Annotation Properties Structure (Continued)

Text Annotations

The fields in the properties structure of Text Annotations are as follows:

Tag	Description
fontsize	9 to 72 points
fontname	Helvetica, Courier, Times, Symbol, and Other (where Other is a valid name of a font on the local system)
textangle	0.0 to 360.0 degrees
alignment	0.0 to 1.0 where 0.0 = right justified and 1.0 = left justified
location	[x, y] normalized units
hide	1=hidden, 0=visible
name	scalar string (unique within all graphics)
value	string (scalar or vector) annotation formula (see note below)
enable_formatting	set to allow “!” chars for font commands
color	see “Color Names” on page 83
uvalue	any value of any type (only returned in structure if defined)

Table 2-9: Text Annotation Properties Structure

Note

Each vector element of the annotation formula (see “value” tag above) is parsed once, left to right, for vertical bars (|).

- Two vertical bars surrounding a data item name will be replaced by the corresponding data value(s), possibly requiring multiple lines.
- Two adjacent bars will be replaced by a single bar.
- Two bars surrounding text that is not a data item name will be left as is.

Axes

The fields in the properties structure of Axes are as follows:

Tag	Description
title_FontSize	9 to 72 points
title_Fontname	Helvetica, Courier, Times, Symbol, and Other (where Other is a valid name of a font on the local system)
title_Color	see “Color Names” on page 83
tick_FontSize	9 to 72 points
tick_Fontname	Helvetica, Courier, Times, Symbol, and Other (where Other is a valid name of a font on the local system)
tick_FontColor	see “Color Names” on page 83
gridStyle	see linestyle
color	see “Color Names” on page 83
thick	1 to 10 pixels
location	[x, y] data units
minor	number of minor ticks (minimum 0)
major	number of major ticks (minimum 0)
default_minor	set to compute default number of minor ticks
default_major	set to compute default number of major ticks
tickLen	normalized units * 100 = percent of visualization dimensions
subticklen	normalized units * 100 = percent of ticklen
tickDir	0 = up (or right), 1 = down (or left)
textPos	0 = below (or left), 1 = above (or right)
tickFormat	standard IDL FORMAT string (See STRING function) excluding parentheses
exact	set to use exact range specified

Table 2-10: Axis Properties Structure

Tag	Description
log	set to display axis as log
hide	1=hidden, 0=visible
name	scalar string (unique within all graphics)
compute_range	set to compute axis range from data min/max
tickName	if defined, vector of strings to use at major tick marks
uvalue	any value of any type (only returned in structure if defined)

Table 2-10: Axis Properties Structure (Continued)

Colorbars

The fields in the properties structure of Colorbars are as follows:

Tag	Description
title_Fontsize	9 to 72 points
title_Fontname	Helvetica, Courier, Times, Symbol, and Other (where Other is a valid name of a font on the local system)
title_Color	see “Color Names” on page 83
tick_FontSize	see fontsize
tick_Fontname	see fontname
tick_FontColor	see “Color Names” on page 83
color	see “Color Names” on page 83
thick	1 to 10 pixels
location	[x, y]; where [0, 0] = lower left and [1, 1] = position where the entire colorbar fits into the upper right of the visualization
minor	number of minor ticks (minimum 0)
major	number of major ticks (minimum 0)
default_minor	set to compute default number of minor ticks

Table 2-11: Colorbar Properties Structure

Tag	Description
default_major	set to compute default number of major ticks
tickLen	normalized units * 100 = percent of visualization dimensions
subticklen	normalized units * 100 = percent of ticklen
tickFormat	standard IDL FORMAT string (See STRING function) excluding parentheses
show_axis	set to display the colorbar axis
show_outline	set to display the colorbar outline
axis_thick	see thick
dimensions	[width, height] normalized units
hide	1=hidden, 0=visible
name	scalar string (unique within all graphics)
uvalue	any value of any type (only returned in structure if defined)

Table 2-11: Colorbar Properties Structure (Continued)

Contours

The fields in the properties structure of Contours are as follows:

Tag	Description
min_value	minimum contour value to display
max_value	maximum contour value to display
downhill	set to display downhill tick marks
fill	set to display contour levels as filled
c_thick	vector of thickness values (see thick)
c_linestyle	vector of linestyle values (see linestyle)
c_color	vector of color names (see “Color Names” on page 83)

Table 2-12: Contour Properties Structure

Tag	Description
default_n_levels	set to default the number of levels
n_levels*	specify a positive number for a specific number of levels
hide	1=hidden, 0=visible
name	scalar string (unique within all graphics)
uvalue	any value of any type (only returned in structure if defined)

*The MIN and MAX value of the data are returned as contour levels when N_LEVELS is set. Because of this, when setting N_LEVELS, contour plots appear to have N-2 contour levels because the first (MIN) and last (MAX) level is not shown. With LIVE_CONTOUR, this results in a legend that contains unnecessary items in the legend (the MIN and the MAX contour level).

Table 2-12: Contour Properties Structure (Continued)

Images

The fields in the properties structure of Images are as follows:

Tag	Description
order	set to draw from top to bottom
sizing_constraint	[0|1|2] 0=Natural, 1=Aspect, 2=Unrestricted
dont_byte_scale	set to inhibit byte scaling the image
palette	name of managed colortable
hide	1=hidden, 0=visible
name	scalar string (unique within all graphics)
uvalue	any value of any type (only returned in LIVE_INFO structure if defined)

Table 2-13: Image Properties Structure

Legends

The fields in the properties structure of Legends are as follows:

Tag	Description
title_FontSize	9 to 72 points
title_Fontname	Helvetica, Courier, Times, Symbol, and Other (where Other is a valid name of a font on the local system)
title_Color	see “Color Names” on page 83
item_fontSize	see fontsize
item_fontName	Helvetica, Courier, Times, Symbol, and Other (where Other is a valid name of a font on the local system)
text_color	color of item text (see “Color Names” on page 83)
border_gap	normalized units * 100 = percent of item text height
columns	number of columns to display the items in (minimum 0)
gap	normalized units * 100 = percent of item text height
glyph_Width	normalized units * 100 = percent of item text height
fill_color	see “Color Names” on page 83
outline_color	see “Color Names” on page 83
outline_thick	see thick
location	[x, y]; where [0, 0] = lower left and [1, 1] = position where the entire legend fits into the upper right of the visualization
show_fill	set to display the fill color
show_outline	set to display the legend outline
title_text	String to display in the legend title
item_format	standard IDL FORMAT string (See STRING function) excluding parentheses (contour legends only)
hide	1=hidden, 0=visible

Table 2-14: Legend Properties Structure

Tag	Description
name	scalar string (unique within all graphics)
uvalue	any value of any type (only returned in structure if defined)

Table 2-14: Legend Properties Structure (Continued)

Surfaces

The fields in the properties structure of Surfaces are as follows:

Tag	Description
min_value	minimum plot line value to display
max_value	maximum plot line value to display
lineStyle	0=solid, 1=dotted, 2=dashed, 3=dash dot, 4=dash dot dot, 5=long dash
color	see "Color Names" on page 83
thick	1 to 10 pixels
bottom	see "Color Names" on page 83
style	0=point, 1=wire, 2=solid, 3=ruledXZ, 4=ruledYZ, 5=lego (wire), 6=lego (solid)
shading	0=flat, 1=Gouraud
hidden_lines	set to not display hidden lines or points
show_skirt	set to display the surface skirt
skirt	z value at which skirt is drawn (data units)
hide	1=hidden, 0=visible
name	scalar string (unique within all graphics)
uvalue	any value of any type (only returned in structure if defined)

Table 2-15: Surface Properties Structure

Entire Visualizations

The fields in the properties structure of Entire Visualizations are as follows:

Tag	Description
location	[x, y] normalized units
dimensions	[width, height] normalized units
transparent	set to avoid erasing to the background color
color	background color (see "Color Names" on page 83)
hide	1=hidden, 0=visible
name	scalar string (unique within all graphics)
uvalue	any value of any type (only returned in structure if defined)

Table 2-16: Visualization Properties Structure

Windows

The fields in the properties structure of Windows are as follows:

Tag	Description
dimensions	2-element integer vector (pixels)
hide	boolean (0=show, 1=hide)
location	2-element integer vector (pixels) from upper left corner of screen
title	string

Table 2-17: Windows Properties Structure

Examples

```
LIVE_INFO, 'x axis', PROPERTIES=myProps
```

Version History

Introduced: 5.1

See Also

LIVE_CONTROL, LIVE_STYLE

LIVE_LINE

The LIVE_LINE procedure is an interface for line annotation.

Syntax

LIVE_LINE [, ARROW_ANGLE=*value*{1.0 to 179.0}] [, /ARROW_END] [, ARROW_SIZE=*value*{0.0 to 0.3}] [, /ARROW_START] [, COLOR='*color name'*] [, /DIALOG] [, DIMENSIONS=*[width, height]*] [, ERROR=*variable*] [, /HIDE] [, LINESTYLE={0 | 1 | 2 | 3 | 4 | 5}] [, LOCATION=*[x, y]*] [, NAME=*string*] [, /NO_DRAW] [, /NO_SELECTION] [, REFERENCE_OUT=*variable*] [, THICK=pixels{1 to 10}] [, VISUALIZATION_IN=*string*] [, WINDOW_IN=*string*]

Arguments

None

Keywords

ARROW_ANGLE

Set this keyword to a floating-point number between 1.0 and 179.0 degrees to indicate the angle of the arrowheads. The default is 30.0.

ARROW_END

Set this keyword to indicate an arrowhead should be drawn at the end of the line. It is not drawn by default.

ARROW_SIZE

Set this keyword to a floating-point number between 0.0 and 0.3 (normalized coordinates) to indicate the size of the arrowheads. The default is 0.02.

ARROW_START

Set this keyword to indicate an arrowhead should be drawn at the start of the line. It is not drawn by default.

COLOR

Set this keyword to a string (case-sensitive) of the color to be used for the line. The default is ‘Black’. The following colors are available:

- Black
- Blue
- Light Gray
- Light Blue
- Red
- Magenta
- Brown
- Light Cyan
- Green
- Cyan
- Light Red
- Light Magenta
- Yellow
- Dark Gray
- Light Green
- White

DIALOG

Set this keyword to display the line properties dialog appear. The dialog will have all known properties supplied by keywords filled in.

DIMENSIONS

Set this keyword to a two-element vector of the form [width, height] to specify the X and Y components of the line in normalized coordinates. The default is [0.2, 0.2].

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

HIDE

Set this keyword to a boolean value indicating whether this item should be hidden.

- 0 = Visible (default)
- 1 = Hidden

LINESTYLE

Set this keyword to a pre-defined line style integer:

- 0 = solid line (default)

- 1 = dotted
- 2 = dashed
- 3 = dash dot
- 4 = dash dot dot
- 5 = long dash

LOCATION

Set this keyword to a two-element, floating-point vector of the form [X, Y] specifying the location of the visualization (relative to the lower left hand corner within the visualization window) in normalized coordinates. The default is [0.5, 0.5].

Note

LOCATION may be adjusted to take into account window decorations.

NAME

Set this keyword equal to a string containing the name to be associated with this item. The name must be unique within the given window or buffer (WINDOW_IN). If not specified, a unique name will be assigned automatically.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

REFERENCE_OUT

Set this keyword to a variable to return a structure defining names of the modified visualization's properties. The fields of the structure are shown in the following table.

Tag	Description
WIN	Window Name
VIS	Visualization Name
GRAPHIC	Graphic Name the line created

Table 2-18: Fields of the LIVE_LINE Reference Structure

THICK

Set this keyword to an integer value between 1 and 10, specifying the line thickness to be used to draw the line, in pixels. The default is one pixel.

VISUALIZATION_IN

Set this keyword equal to the name (string, case-insensitive) of a LIVE tool visualization. The VIS field from the REFERENCE_OUT keyword from the creation of the LIVE tool will provide the visualization name. If only one visualization is present in the window or buffer (WINDOW_IN), this keyword will default to it.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

Examples

```
LIVE_LINE, WINDOW_IN='Live Plot 2', $
   VISUALIZATION_IN='line plot visualization'
; Units are in the visualization units ( based on axis ranges).
```

Version History

Introduced: 5.1

See Also

LIVE_RECT, LIVE_TEXT

LIVE_LOAD

The LIVE_LOAD procedure loads into memory the complete set of routines necessary to run all LIVE tools. By default, portions of the set are loaded when first needed during the IDL session. If you expect to frequently use the tools, you may wish to call LIVE_LOAD from your IDL “startup file”.

Syntax

LIVE_LOAD

Arguments

None

Keywords

None

Version History

Introduced: 5.2

LIVE_OPLOT

The LIVE_OPLOT procedure allows the insertion of data into pre-existing plots.

Syntax

LIVE_OPLOT, *Yvector1* [,... , *Yvector25*] [, ERROR=*variable*] [, INDEPENDENT=*vector*] [, NAME=*structure*] [, /NEW_AXES] [, /NO_DRAW] [, /NO_SELECTION] [, REFERENCE_OUT=*variable*] [, REPLACE={*structure* | {0 | 1 | 2 | 3 | 4}}] [, SUBTYPE={‘LinePlot’ | ‘ScatterPlot’ | ‘Histogram’ | ‘PolarPlot’}] [, VISUALIZATION_IN=*string*] [, WINDOW_IN=*string*] [, {X | Y}_TICKNAME=*array*] [, {X | Y}AXIS_IN=*string*]

Arguments

YVector

A vector argument of data. Up to 25 of these arguments may be specified.

Keywords

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

INDEPENDENT

Set this keyword to an independent vector specifying the X-Values for LIVE_OPLOT.

NAME

Set this keyword to a structure containing suggested names for the data items to be created for this visualization. See the REPLACE keyword for details on how they will be used. The fields of the structure are as follows. (Any or all of the tags may be set.)

Tag	Description
DATA	Dependent Data Name(s)
I	Independent Data Name

Table 2-19: Fields of the NAME keyword

The default for a field is to use the given variable name. If the variable does not have a name (i.e., is an expression), a default name is automatically generated. The dependent data names will be used in a round-robin fashion if more data than names are input.

Note

Only one independent vector is allowed; all dependent vectors will use the independent vector.

NEW_AXES

Set this keyword to generate a new set of axes for this plot line. If this keyword is specified, the [XY]AXIS_IN keywords will not be used.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

REFERENCE_OUT

Set this keyword to a variable to return a structure defining the names of the modified items. The fields of the structure are shown in the following table.

Tag	Description
WIN	Window Name
VIS	Visualization Name
XAXIS	X-Axis Name
YAXIS	Y-Axis Name
GRAPHIC	Graphic Name(s)
LEGEND	Legend Name
DATA	Dependent Data Name(s)
I	Independent Data Name

Table 2-20: Fields of the LIVE_OPLOT Reference Structure

REPLACE

Set this keyword to a structure containing tags as listed for the NAME keyword, with scalar values corresponding to the replacement options listed below. (Any or all of the tags may be set.) The replacement settings are used to determine what action to take when an item (such as data) being input would have the same name as one already existing in the given window or buffer (WINDOW_IN).

Setting	Action Taken
0	New items will be given unique names.
1	Existing items will be replaced by new items (i.e., the old items will be deleted and new ones created).
2	User will be prompted for the action to take.
3	The values of existing items will be replaced. This will cause dynamic updating to occur for any current uses, e.g., a visualization would redraw to show the new value.

Table 2-21: REPLACE keyword Settings and Action Taken

Setting	Action Taken
4	Default. Option 0 will be used for items that do not have names (e.g., data input as an expression rather than a named variable, with no name provided via the NAME keyword). Option 3 will be used for all named items.

Table 2-21: REPLACE keyword Settings and Action Taken

SUBTYPE

Set this keyword to a string (case-insensitive) containing the desired type of plot. SUBTYPE defaults to whatever is being inserted into, if the [XY]AXIS_IN keyword is set. If the keywords are not set, then the default is line plot. Valid strings are:

- ‘LinePlot’ (default)
- ‘ScatterPlot’
- ‘Histogram’
- ‘PolarPlot’

Note

If inserting into a group (defined by the set of axes) that is polar, SUBTYPE cannot be defined as line, scatter, or histogram. The opposite is also true: if inserting into a line, scatter, or histogram group, then SUBTYPE cannot be defined as polar.

VISUALIZATION_IN

Set this keyword equal to the name (string, case-insensitive) of a LIVE tool visualization. The VIS field from the REFERENCE_OUT keyword from the creation of the LIVE tool will provide the visualization name. If only one visualization is present in the window or buffer (WINDOW_IN), this keyword will default to it.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

X_TICKNAME

Set this keyword equal to an array of strings to be used to label the tick mark for the X axis. The default equals the values computed from the data range.

Y_TICKNAME

Set this keyword equal to an array of strings to be used to label the tick mark for the Yaxis. The default equals the values computed from the data range.

XAXIS_IN

Set this keyword equal to the string name of an existing axis. The name can be obtained from the REFERENCE_OUT keyword, or visually from the GUI. The default is to use the first set of axes in the plot.

Note

If this keyword is set, you must also set the YAXIS_IN keyword, and both keywords must be set to a “pair” of axes. The X and Y axes given must be associated with the same plot line.

YAXIS_IN

Set this keyword equal to the string name of an existing axis. The name can be obtained from the REFERENCE_OUT keyword, or visually from the GUI. The default is to use the first set of axes in the plot.

Note

If this keyword is set, you must also set the XAXIS_IN keyword, and both keywords must be set to a “pair” of axes. The X and Y axes given must be associated with the same plot line.

Examples

```
LIVE_OPLOT, tempData, pressureData
```

Version History

Introduced: 5.1

See Also

LIVE_PLOT, PLOT, OPLOT

LIVE_PLOT

The LIVE_PLOT procedure creates an interactive plotting environment.

Click on a section of the plot to display a properties dialog. A set of buttons in the upper left corner of the image window allows you to print, undo the last operation, redo the last “undone” operation, copy, draw a line, draw a rectangle, or add text.

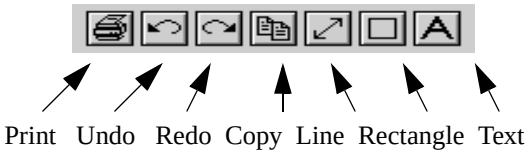


Figure 2-3: LIVE_PLOT Properties Dialog

You can control your LIVE window after it is created using any of several auxiliary routines. See “LIVE_Tools” on page 57 for an explanation.

Syntax

LIVE_PLOT, *Yvector1* [, *Yvector2,..., Yvector25*] [, /BUFFER]
[, DIMENSIONS=*[width, height]*{normal units}] [, /DOUBLE]
[, DRAW_DIMENSIONS=*[width, height]*{devive units}] [, ERROR=*variable*]
[, /HISTOGRAM | , /LINE | , /POLAR | , /SCATTER] [, /INDEXED_COLOR]
[, INSTANCING={-1 | 0 | 1}] [, LOCATION=*[x, y]*{normal units}]
[, INDEPENDENT=*vector*] [, /MANAGE_STYLE] [, NAME=*structure*]
[, /NO_DRAW] [, /NO_SELECTION] [, /NO_STATUS] [, /NO_TOOLBAR]
[, PARENT_BASE=*widget_id* | , TLB_LOCATION=*[Xoffset, Yoffset]*{device units}]
[, PREFERENCE_FILE=*filename*{full path}] [, REFERENCE_OUT=*variable*]
[, RENDERER={0 | 1}] [, REPLACE={*structure* | {0 | 1 | 2 | 3 | 4}}]
[, STYLE=*name_or_reference*] [, TEMPLATE_FILE=*filename*] [, TITLE=*string*]
[, WINDOW_IN=*string*] [, {/X | /Y}LOG] [, {X | Y}RANGE=*[min, max]*{data units}] [, {X | Y}_TICKNAME=*array*]

Arguments

YVector

A vector of data. Up to 25 of these arguments may be specified. If any of the data is stored in IDL variables of type DOUBLE, LIVE_PLOT uses double precision to store the data and to draw the result.

Keywords

BUFFER

Set this keyword to bypass the creation of a LIVE window and send the visualization to an offscreen buffer. The WINDOW field of the reference structure returned by the REFERENCE_OUT keyword will contain the name of the buffer.

DIMENSIONS

Set this keyword to a two-element, floating-point vector specifying the dimensions of the visualization in normalized coordinates. The default is [1.0, 1.0].

DOUBLE

Set this keyword to force LIVE_PLOT to use double-precision to draw the result. This has the same effect as specifying data in the YVector argument using IDL variables of type DOUBLE.

DRAW_DIMENSIONS

Set this keyword equal to a vector of the form [width, height] representing the desired size of the LIVE tools draw widget (in pixels). The default is [452, 452].

Note

This default value may be different depending on previous template projects.

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

HISTOGRAM

Set this keyword to represent plot values as a histogram.

INDEPENDENT

Set this keyword to an independent vector specifying X-values for LIVE_PLOT.

INDEXED_COLOR

If set, the indexed color mode will be used. The default is TrueColor. (See *Using IDL* for more information on color modes.)

INSTANCING

Set this keyword to 1 to instance drawing on, or 0 to turn it off. The default (-1) is to use instancing if and only if the “software renderer” is being used (see RENDERER). For more information, see “Instancing” in the *Objects and Object Graphics* manual.

LINE

Set this keyword to represent plot values as a line plot. This is the default. Alternate choices are provided by keywords HISTOGRAM, POLAR, and SCATTER.

LOCATION

Set this keyword to a two-element, floating-point vector of the form [X, Y] specifying the location of the visualization (relative to the lower left hand corner within the visualization window) in normalized coordinates. The default is [0.0, 0.0].

Note

LOCATION may be adjusted to take into account window decorations.

MANAGE_STYLE

Set this keyword to have the passed in style item destroyed when the LIVE tool window is destroyed. This keyword will have no effect if the STYLE keyword is not set to a style item.

NAME

Set this keyword to a structure containing suggested names for the data items to be created for this visualization. See the REPLACE keyword for details on how they will be used. The fields of the structure are as follows. (Any or all of the tags may be set.)

Tag	Description
DATA	Dependent Data Name(s)
I	Independent Data Name

Table 2-22: Fields of the NAME keyword

The default for a field is to use the given variable name. If the variable does not have a name (i.e., is an expression), a default name is automatically generated. The dependent data names will be used in a round-robin fashion if more data than names are input.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

NO_STATUS

Set this keyword to prevent the creation of the status bar.

NO_TOOLBAR

Set this keyword to prevent the creation of the toolbar.

PARENT_BASE

Set this keyword to the widget ID of an existing base widget to bypass the creation of a LIVE window and create the visualization within the specified base widget.

Note

The location of the draw widget is not settable. To insert a tool into your widget application, you must determine the setting from the parent base sent to the tool. LIVE_DESTROY on a window is recommended when using PARENT_BASE so that proper memory cleanup is done. Destroying the parent base is not sufficient.

Note

When specifying a PARENT_BASE, that parent base must be running in a non-blocking mode. Putting a LIVE tool into a realized base already controlled by XMANAGER will override the XMANAGER mode to /NO_BLOCK even if blocking had been in effect.

POLAR

Set this keyword to represent plot values as a polar plot. In this case, the arguments to LIVE_PLOT represent values of r (radius), while the INDEPENDENT keyword represents the values of T (angle theta). If POLAR is set, you must specify INDEPENDENT.

REFERENCE_OUT

Set this keyword to a variable to return a structure defining the names of the modified items. The fields of the structure are shown in the following table.

Tag	Description
WIN	Window Name
VIS	Visualization Name
XAXIS	X-Axis Name
YAXIS	Y-Axis Name
GRAPHIC	Graphic Name(s)
LEGEND	Legend Name
DATA	Dependent Data Name(s)
I	Independent Data Name

Table 2-23: Fields of the LIVE_PLOT Reference Structure

RENDERER

Set this keyword to 1 to use the “software renderer”, or 0 to use the “hardware renderer”. The default (-1) is to use the setting in the IDE (IDL Development Environment) preferences; if the IDE is not running, however, the default is hardware rendering. For more information, see “Hardware vs. Software Rendering” in the *Using IDL* manual.

REPLACE

Set this keyword to a structure containing tags as listed for the NAME keyword, with scalar values corresponding to the replacement options listed below. (Any or all of the tags may be set.) The replacement settings are used to determine what action to take when an item (such as data) being input would have the same name as one already existing in the given window or buffer (WINDOW_IN).

Setting	Action Taken
0	New items will be given unique names.
1	Existing items will be replaced by new items (i.e., the old items will be deleted and new ones created).
2	User will be prompted for the action to take.
3	The values of existing items will be replaced. This will cause dynamic updating to occur for any current uses, e.g., a visualization would redraw to show the new value.
4	Default. Option 0 will be used for items that do not have names (e.g., data input as an expression rather than a named variable, with no name provided via the NAME keyword). Option 3 will be used for all named items.

Table 2-24: REPLACE keyword Settings and Action Taken

SCATTER

Set this keyword to represent plot values as a scatter plot.

STYLE

Set this keyword to either a string specifying a style name created with LIVE_STYLE.

Note

If STYLE is not set, the default plot style will be used.

TITLE

Set this keyword to a string specifying the title to give the main window. It must not already be in use. A default will be chosen if no title is specified.

TLB_LOCATION

Set this keyword to a two-element vector of the form [*Xoffset*, *Yoffset*] specifying the offset (in pixels) of the LIVE window from the upper left corner of the screen. This keyword has no effect if the PARENT_BASE keyword is set. The default is [0, 0].

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer, in which to display the visualization. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. The default is to create a new window.

XLOG

Set this keyword to make the X axis a log axis. The default is 0 (linear axis).

YLOG

Set this keyword to make the Y axis a log axis. The default is 0 (linear axis).

XRANGE

Set this keyword equal to a two-element array that defines the minimum and maximum values of the X axis range. The default equals the values computed from the data range.

YRANGE

Set this keyword equal to a two-element array that defines the minimum and maximum values of the Y axis range. The default equals the values computed from the data range.

X_TICKNAME

Set this keyword equal to an array of strings to be used to label the tick mark for the X axis. The default equals the values computed from the data range.

Y_TICKNAME

Set this keyword equal to an array of strings to be used to label the tick mark for the Yaxis. The default equals the values computed from the data range.

Examples

```
; Plot two data sets simultaneously:
LIVE_PLOT, tempdata, pressureData
```

Note

This is a “Live” situation. When data of the same name is used multiple times within the same window, it always represents the same internal data item. For example, if one does the following:

```
Y= indgen(10)
LIVE_PLOT, Y, WINDOW_IN=w, DIMENSIONS=d, LOCATION=loc1
Y = indgen(20)
LIVE_PLOT, Y, WINDOW_IN=w, DIMENSIONS=d, LOCATION=loc2
```

The first plot will update to use the Y of the second plot when the second plot is drawn. If the user wants to display 2 “tweaks” of the same data, a different variable name must be used each time, or at least one should be an expression (thus not a named variable). For example:

```
LIVE_PLOT, Y1,...
LIVE_PLOT, Y2,...
```

or

```
LIVE_PLOT, Y,...
LIVE_PLOT, myFunc(Y),...
```

In last example, the data of the second visualization will be given a default unique name since an expression rather than a named variable is input.

Note

The above shows the default behavior for naming and replacing data, which can be overridden using the NAME and REPLACE keywords.

Version History

Introduced: 5.0

See Also

LIVE_OPLOT, PLOT, OPLOT

LIVE_PRINT

The LIVE_PRINT procedure allows the user to print a given window to the printer.

Syntax

LIVE_PRINT [, /DIALOG] [, ERROR=*variable*] [, WINDOW_IN=*string*]

Arguments

None

Keywords

DIALOG

Set this keyword to have a print dialog appear.

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

Obsolete Keywords

The following keywords are obsolete:

- SETUP

For information on obsolete keywords, See Appendix I, “Obsolete Features”.

Examples

```
LIVE_PRINT, WINDOW_IN='Live Plot 2'
```

Version History

Introduced: 5.1

See Also

DIALOG_PRINTERSETUP, DIALOG_PRINTJOB

LIVE_RECT

The LIVE_RECT procedure is an interface for insertion of rectangles.

Syntax

LIVE_RECT [, COLOR='*color name'*] [, /DIALOG] [, DIMENSIONS=*[width, height]*] [, ERROR=*variable*] [, /HIDE] [, LINESTYLE={0 | 1 | 2 | 3 | 4 | 5}] [, LOCATION=*[x, y]*] [, NAME=*string*] [, /NO_DRAW] [, /NO_SELECTION] [, REFERENCE_OUT=*variable*] [, THICK=*pixels*{1 to 10}] [, VISUALIZATION_IN=*string*] [, WINDOW_IN=*string*]

Arguments

None

Keywords

COLOR

Set this keyword to a string (case-sensitive) of the color to be used for the rectangle. The default is ‘Black’. The following colors are available:

- Black
- Blue
- Light Gray
- Light Blue
- Red
- Magenta
- Brown
- Light Cyan
- Green
- Cyan
- Light Red
- Light Magenta
- Yellow
- Dark Gray
- Light Green
- White

DIALOG

Set this keyword to have the rectangle dialog appear. This dialog will fill in known attributes from set keywords.

DIMENSIONS

Set this keyword to a two-element, floating-point vector of the form [width, height] to specify the dimensions of the rectangle in normalized coordinates. The default is [0.2, 0.2].

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

HIDE

Set this keyword to a boolean value indicating whether this item should be hidden.

- 0 = Visible (default)
- 1 = Hidden

LINESTYLE

Set this keyword to a pre-defined line style integer:

- 0 = Solid line (default)
- 1 = dotted
- 2 = dashed
- 3 = dash dot
- 4 = dash dot dot
- 5 = long dash

LOCATION

Set this keyword to a two-element, floating-point vector of the form [X, Y] specifying the location of the visualization (relative to the lower left hand corner within the visualization window) in normalized coordinates. The default is [0.5, 0.5].

Note

LOCATION may be adjusted to take into account window decorations.

NAME

Set this keyword equal to a string containing the name to be associated with this item. The name must be unique within the given window or buffer (WINDOW_IN). If not specified, a unique name will be assigned automatically.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

REFERENCE_OUT

Set this keyword to a variable to return a structure defining the names of the modified items. The fields of the structure are shown in the following table.

Tag	Description
WIN	Window Name
VIS	Visualization Name
GRAPHIC	Graphic Name the rectangle created

Table 2-25: Fields of the LIVE_RECT Reference Structure

THICK

Set this keyword to an integer value between 1 and 10, specifying the line thickness to be used to draw the line, in pixels. The default is one pixel.

VISUALIZATION_IN

Set this keyword equal to the name (string, case-insensitive) of a LIVE tool visualization. The VIS field from the REFERENCE_OUT keyword from the creation of the LIVE tool will provide the visualization name. If only one visualization is present in the window or buffer (WINDOW_IN), this keyword will default to it.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are

also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

Examples

```
LIVE_RECT, LOCATION=[0.1,0.1],DIMENSIONS=[0.2,0.2],$
   WINDOW_IN='Live Plot 2',VISUALIZATION_IN='line plot'
```

Version History

Introduced: 5.1

See Also

LIVE_LINE, LIVE_TEXT

LIVE_STYLE

The LIVE_STYLE function allows the user to create a style.

Syntax

Style = LIVE_STYLE ({ 'contour' | 'image' | 'plot' | 'surface'}
[, BASE_STYLE=*style_name*] [, COLORBAR_PROPERTIES=*structure*]
[, ERROR=*variable*] [, GRAPHIC_PROPERTIES=*structure*] [, GROUP=*widget_id*]
[, LEGEND_PROPERTIES=*structure*] [, NAME=*string*] [, /SAVE]
[, TEMPLATE_FILE=*filename*] [, VISUALIZATION_PROPERTIES=*structure*]
[, {X | Y | Z}AXIS_PROPERTIES=*structure*])

Arguments

Type

A string (case-insensitive) specifying the visualization style type. Available types include: plot, contour, image, and surface.

Keywords

BASE_STYLE

Set this keyword equal to a string (case-insensitive) containing the name of a previously saved style. It will be used for defaulting unspecified properties. If not specified, only those properties you provide will be put into the style. The basic styles that will always exist include:

Visualization Type	Style Name
plot	‘Basic Plot’
contour	‘Basic Contour’
image	‘Basic Image’
surface	‘Basic Surface’

Table 2-26: Base Style Strings

COLORBAR_PROPERTIES

The table below lists the structure of the COLORBAR_PROPERTIES keyword.

Tag	Description
title_FontSize	9 to 72 points
title_Fontname	Helvetica, Courier, Times, Symbol, and Other (where Other is a valid name of a font on the local system)
title_Color	see color table
tick_FontSize	see fontsize
tick_Fontname	see fontname
tick_FontColor	see color table
color	see color table
thick	1 to 10 pixels
location	[x, y] normalized units
minor	number of minor ticks (minimum 0)
major	number of major ticks (minimum 0)
default_minor	set to compute default number of minor ticks
default_major	set to compute default number of major ticks
tickLen	normalized units * 100 = percent of visualization dimensions
subticklen	normalized units * 100 = percent of ticklen
tickFormat	see format
show_axis	set to display the colorbar axis
show_outline	set to display the colorbar outline
axis_thick	see thick
dimensions	[width, height] normalized units
hide	1=hidden, 0=visible

Table 2-27: Colorbar Properties Structure

GRAPHIC_PROPERTIES

Set this keyword equal to a scalar or vector of structures defining the graphic properties to use in creating the style. (Use a vector if you want successive graphics to have different properties, e.g., different colored lines in a line plot. The structures are used in a round-robin fashion.) Not all properties need be specified (see BASE_STYLE). The complete structure definitions are listed in the following tables.

Plots

Tag	Data Type/Description
color	string (see color table)
hide	boolean (1=hidden, 0=visible)
linestyle	integer (0=solid, 1=dotted, 2=dashed, 3=dash dot, 4=dash dot dot, 5=long dash)
nSum	integer (1 to number of elements to average over)
symbol_size	[x,y] normalized units relative to the visualization
symbol_type	integer (1-7)
thick	integer (1 to 10 pixels)

Table 2-28: Plot Graphic Properties Structure

Images

Tag	Data Type/Description
hide	boolean (1=hidden, 0=visible)
order	boolean (set to draw from top to bottom)
sizing_constraint	integer (0=natural, 1=aspect, 2=unrestricted)

Table 2-29: Image Graphic Properties Structure

Contours

Tag	Data Type/Description
downhill	boolean (set to display downhill tick marks)
fill	boolean (set to display contour levels as filled)
hide	boolean (1=hidden, 0=visible)
n_levels	integer (number of levels)
c_thick	vector of thickness values
c_linestyle	vector of linestyle values
c_color	vector of color names
default_n_levels	integer (set to default number of levels)

Table 2-30: Contour Graphic Properties Structure

Surfaces

Tag	Data Type/Description
bottom	string (see color table)
color	string (see color table)
hidden_lines	boolean (1=don't show, 0=show)
hide	boolean (1=hidden, 0=visible)
lineStyle	integer (0=solid, 1=dotted, 2=dashed, 3=dash dot, 4=dash dot dot, 5=long dash)
shading	boolean (0=flat, 1=Gouraud)
show_skirt	boolean (1=show, 0=don't show)
skirt	float (z value at which skirt is drawn [data units])
style	integer (0=point, 1=wire, 2=solid, 3=ruledXZ, 4=ruledYZ, 5=lego (wire), 6=lego (solid))
thick	integer (1 to 10 pixels)

Table 2-31: Surface Graphic Properties Structure

GROUP

Set this keyword to the widget ID of the group leader for error message display. This keyword is used only when the ERROR keyword is not set. If only one LIVE tool window is present in the IDL session, it will default to that.

LEGEND_PROPERTIES

Set this keyword equal to a structure defining the legend properties to use in creating the style. Not all properties need be specified (see BASE_STYLE). The complete structure definitions for different types of styles are listed in the following tables.

Tag	Description
title_FontSize	9 to 72 points
title_Fontname	Helvetica, Courier, Times, Symbol, and Other (where Other is a valid name of a font on the local system)
title_Color	see color table
item_fontSize	see fontsize
item_fontName	see fontname
text_color	see color
border_gap	normalized units * 100 = percent of item text height
columns	number of columns to display the items in (minimum 0)
gap	normalized units * 100 = percent of item text height
glyph_Width	normalized units * 100 = percent of item text height
fill_color	see color table
outline_color	see color table
outline_thick	see thick
location	[x, y] normalized units
show_fill	set to display the fill color
show_outline	set to display the legend outline

Table 2-32: Legend Properties Structure

Tag	Description
hide	1=hidden, 0=visible

Table 2-32: Legend Properties Structure (Continued)

NAME

Set this keyword to a string containing a name for the returned style. If the SAVE keyword is set, the name must be unique template file. If not specified, a name will be automatically generated.

SAVE

Set this keyword to save the style in the template file. The supplied Name must not already exist in the template file or an error will be returned.

VISUALIZATION_PROPERTIES

Set this keyword equal to a structure defining the visualization properties to use in creating the style. Not all properties need be specified (see BASE_STYLE). The complete structure definition is in the following table.

Tag	Data Type
color	string (see color table) for background
hide	boolean
transparent	boolean

Table 2-33: Visualization Properties Structure

XAXIS_PROPERTIES, YAXIS_PROPERTIES, ZAXIS_PROPERTIES

Set these keywords equal to a scalar or vector of structures defining the axis properties to use in creating the style. (Use a vector to specify property structures for successive axes of the same direction have different properties. The structures are used in a round-robin fashion.) Not all properties need be specified (see BASE_STYLE). The user need only define the fields of the structure they wish to be

different from the BASE style. The complete structure definition is shown in the following table.

Tag	Data Type
color	string (see color table)
default_major	integer
default_minor	integer
exact	boolean
gridstyle	integer (0-5) (linestyle)
hide	boolean
location	3-element floating vector (normalized units)
major	integer (default=-1, computed by IDL)
minor	integer (default=-1, computed by IDL)
thick	integer (1-10)
tickDir	integer
tickLen	float (normalized units)
tick_fontname	string
tick_fontsize	integer

Table 2-34: Axis Properties Structure

Examples

```
Style=LIVE_STYLE('plot',BASE_STYLE='basic plot', $
   GRAPHIC_PROPERTIES={color:'red'})
```

Version History

Introduced: 5.1

See Also

LIVE_INFO, LIVE_CONTROL

LIVE_SURFACE

The LIVE_SURFACE procedure creates an interactive plotting environment for multiple surfaces. Because the interactive environment requires extra system resources, this routine is most suitable for relatively small data sets. If you find that performance does not meet your expectations, consider using the Direct Graphics SURFACE routine or the Object Graphics IDLgrSurface class directly.

After LIVE_SURFACE has been executed, you can double-click on a section of the surface to display a properties dialog. A set of buttons in the upper left corner of the image window allows you to print, undo the last operation, redo the last “undone” operation, copy, draw a line, draw a rectangle, or add text.

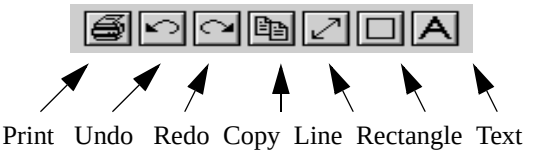


Figure 2-4: LIVE_SURFACE Properties Dialog

You can control your LIVE window after it is created using any of several auxiliary routines. See “LIVE_Tools” on page 57 for an explanation.

Syntax

LIVE_SURFACE, *Data*, *Data2*,... [, /BUFFER] [, DIMENSIONS=*[width, height]*{normal units}] [, /DOUBLE] [, DRAW_DIMENSIONS=*[width, height]*{devive units}] [, ERROR=*variable*] [, /INDEXED_COLOR] [, INSTANCING={-1 | 0 | 1}] [, LOCATION=*[x, y]*{normal units}] [, /MANAGE_STYLE] [, NAME=*structure*] [, /NO_DRAW] [, /NO_SELECTION] [, /NO_STATUS] [, /NO_TOOLBAR] [, PARENT_BASE=*widget_id* | , TLB_LOCATION=*[Xoffset, Yoffset]*{device units}] [, PREFERENCE_FILE=*filename*{full path}] [, REFERENCE_OUT=*variable*] [, RENDERER={0 | 1}] [, REPLACE={*structure* | {0 | 1 | 2 | 3 | 4}}] [, STYLE=*name_or_reference*] [, TEMPLATE_FILE=*filename*] [, TITLE=*string*] [, WINDOW_IN=*string*] [, {X | Y}INDEPENDENT=*vector*] [, {/X | /Y}LOG] [, {X | Y}RANGE=*[min, max]*{data units}] [, {X | Y}_TICKNAME=*array*]

Arguments

Data

A vector of data. Up to 25 of these arguments may be specified. If any of the data is stored in IDL variables of type DOUBLE, LIVE_SURFACE uses double-precision to store the data and to draw the result.

Keywords

BUFFER

Set this keyword to bypass the creation of a LIVE window and send the visualization to an offscreen buffer. The WINDOW field of the reference structure returned by the REFERENCE_OUT keyword will contain the name of the buffer.

DIMENSIONS

Set this keyword to a two-element, floating-point vector of the form [width, height] specifying the dimensions of the visualization in normalized coordinates. The default is [1.0, 1.0].

DOUBLE

Set this keyword to force LIVE_SURFACE to use double-precision to draw the result. This has the same effect as specifying data in the Data argument using IDL variables of type DOUBLE.

DRAW_DIMENSIONS

Set this keyword equal to a vector of the form [width, height] representing the desired size of the LIVE tools draw widget (in pixels). The default is [452, 452].

Note

This default value may be different depending on previous template projects.

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

INDEXED_COLOR

If set, the indexed color mode will be used. The default is TrueColor. (See *Using IDL* for more information on color modes.)

INSTANCING

Set this keyword to 1 to instance drawing on, or 0 to turn it off. The default (-1) is to use instancing if and only if the “software renderer” is being used (see RENDERER). For more information, see “Instancing” in the *Objects and Object Graphics* manual.

LOCATION

Set this keyword to a two-element, floating-point vector of the form [X, Y] specifying the location of the visualization (relative to the lower left hand corner within the visualization window) in normalized coordinates. The default is [0.0, 0.0].

Note

LOCATION may be adjusted to take into account window decorations.

MANAGE_STYLE

Set this keyword to have the passed in style item destroyed when the LIVE tool window is destroyed. This keyword will have no effect if the STYLE keyword is not set to a style item.

NAME

Set this keyword to a structure containing suggested names for the data items to be created for this visualization. See the REPLACE keyword for details on how they will be used. The fields of the structure are as follows. (Any or all of the tags may be set.)

Tag	Description
DATA	Dependent Data Name(s)

Table 2-35: Fields of the NAME keyword

Tag	Description
IX	Independent X Data Name
IY	Independent Y Data Name

Table 2-35: Fields of the NAME keyword (Continued)

The default for a field is to use the given variable name. If the variable does not have a name (i.e., is an expression), a default name is automatically generated. The dependent data names will be used in a round-robin fashion if more data than names are input.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display

NO_STATUS

Set this keyword to prevent the creation of the status bar.

NO_TOOLBAR

Set this keyword to prevent the creation of the toolbar.

PARENT_BASE

Set this keyword to the widget ID of an existing base widget to bypass the creation of a LIVE window and create the visualization within the specified base widget.

Note

The location of the draw widget is not settable. It is expected that the user who wishes to insert a tool into their own widget application will determine the setting from the parent base sent to the tool.

Note

LIVE_DESTROY on a window is recommended when using PARENT_BASE so that proper memory cleanup is done. Simply destroying the parent base is not sufficient.

Note

When specifying a PARENT_BASE, that parent base must be running in a non-blocking mode. Putting a LIVE tool into a realized base already controlled by XMANAGER will override the XMANAGER mode to /NO_BLOCK even if blocking had been in effect.

REFERENCE_OUT

Set this keyword to a variable to return a structure defining the names of the created items. The fields of the structure are shown in the following table.

Tag	Description
WIN	Window Name
VIS	Visualization Name
GRAPHIC	Graphic Name(s)
XAXIS	X-Axis Name
YAXIS	Y-Axis Name
ZAXIS	Z-Axis Name
LEGEND	Legend Name
DATA	Dependent Data Name(s)
IX	Independent X Data Name
IY	Independent Y Data Name

Table 2-36: Fields of the LIVE_SURFACE Reference Structure

RENDERER

Set this keyword to 1 to use the “software renderer”, or 0 to use the “hardware renderer”. The default (-1) is to use the setting in the IDE (IDL Development Environment) preferences; if the IDE is not running, however, the default is hardware rendering. For more information, see “Hardware vs. Software Rendering” in the *Objects and Object Graphics* manual.

REPLACE

Set this keyword to a structure containing tags as listed for the NAME keyword, with scalar values corresponding to the replacement options listed below. (Any or all of the tags may be set.) The replacement settings are used to determine what action to take when an item (such as data) being input would have the same name as one already existing in the given window or buffer (WINDOW_IN).

Setting	Action Taken
0	New items will be given unique names.
1	Existing items will be replaced by new items (i.e., the old items will be deleted and new ones created).
2	User will be prompted for the action to take.
3	The values of existing items will be replaced. This will cause dynamic updating to occur for any current uses, e.g., a visualization would redraw to show the new value.
4	Default. Option 0 will be used for items that do not have names (e.g., data input as an expression rather than a named variable, with no name provided via the NAME keyword). Option 3 will be used for all named items.

Table 2-37: REPLACE keyword Settings and Action Taken

STYLE

Set this keyword to either a string specifying a style name created with LIVE_STYLE.

TITLE

Set this keyword to a string specifying the title to give the main window. It must not already be in use. A default will be chosen if no title is specified.

TLB_LOCATION

Set this keyword to a two-element vector of the form [*Xoffset*, *Yoffset*] specifying the offset (in pixels) of the LIVE window from the upper left corner of the screen. This keyword has no effect if the PARENT_BASE keyword is set. The default is [0, 0].

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer, in which to display the visualization. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. The default is to create a new window.

XINDEPENDENT

Set this keyword to a vector specifying X values for LIVE_SURFACE. The default is the data's index values.

Note

Only one independent vector is allowed; all dependent vectors will use the independent vector.

YINDEPENDENT

Set this keyword to a vector specifying Y values for LIVE_SURFACE. The default is the data's index values.

Note

Only one independent vector is allowed; all dependent vectors will use the independent vector.

XLOG

Set this keyword to make the X axis a log axis. The default is 0 (linear axis).

YLOG

Set this keyword to make the Y axis a log axis. The default is 0 (linear axis).

XRANGE

Set this keyword equal to a two-element array that defines the minimum and maximum values of the X axis range. The default equals the values computed from the data range.

YRANGE

Set this keyword equal to a two-element array that defines the minimum and maximum values of the Y axis range. The default equals the values computed from the data range.

X_TICKNAME

Set this keyword equal to an array of strings to be used to label the tick mark for the X axis. The default equals the values computed from the data range.

Y_TICKNAME

Set this keyword equal to an array of strings to be used to label the tick mark for the Yaxis. The default equals the values computed from the data range.

Examples

This example visualizes two surface representations. To manipulate any part of the surface, double click on surface to access a graphical user interface:

```
LIVE_SURFACE, tempData, pressureData
```

Note

This is a “Live” situation. When data of the same name is used multiple times within the same window, it always represents the same internal data item. For example, if one does the following:

```
Y = indgen(10)
LIVE_PLOT, Y, WINDOW_IN=w, DIMENSIONS=d, LOCATION=loc1
Y = indgen(20)
LIVE_PLOT, Y, WINDOW_IN=w, DIMENSIONS=d, LOCATION=loc2
```

The first plot will update to use the Y of the second plot when the second plot is drawn. If the user wants to display 2 “tweaks” of the same data, a different variable name must be used each time, or at least one should be an expression (thus not a named variable). For example:

```
LIVE_PLOT, Y1,...
LIVE_PLOT, Y2,...
```

or;

```
LIVE_PLOT, Y,...
LIVE_PLOT, myFunc(Y),...
```

In last example, the data of the second visualization will be given a default unique name since an expression rather than a named variable is input.

Note

The above shows the default behavior for naming and replacing data, which can be overridden using the NAME and REPLACE keywords.

Version History

Introduced: 5.0

See Also

SURFACE, SHADE_SURF

LIVE_TEXT

The LIVE_TEXT procedure is an interface for text annotation. You can control your LIVE window after it is created using any of several auxiliary routines. See "LIVE_Tools" on page 57 for an explanation.

Syntax

LIVE_TEXT[, *Text*] [, ALIGNMENT=*value*{0.0 to 1.0}] [, COLOR='*color name'*] [, /DIALOG] [, /ENABLE_FORMATTING] [, ERROR=*variable*] [, FONTNAME=*string*] [, FONTSIZE=*points*{9 to 72}] [, /HIDE] [, LOCATION=*[x, y]*] [, NAME=*string*] [, /NO_DRAW] [, /NO_SELECTION] [, REFERENCE_OUT=*variable*] [, TEXTANGLE=*value*{0.0 to 360.0}] [, VERTICAL_ALIGNMENT=*value*{0.0 to 1.0}] [, VISUALIZATION_IN=*string*] [, WINDOW_IN=*string*]

Arguments

Text

The string to be used for the text annotation. The default is "Text". If Text is an array of strings, each element of the string array will appear on a separate line.

Keywords

ALIGNMENT

Set this keyword to a floating-point value between 0.0 and 1.0 to indicate the horizontal alignment of the text. The alignment scheme is as follows:

1.0---- -----0.5----- ---0.0

Left Middle Right

COLOR

Set this keyword to a string (case-sensitive) of the foreground color to be used for the text. The default is 'Black'. The following colors are available:

- Black
- Red
- Green
- Yellow
- Blue
- Magenta
- Cyan
- Dark Gray

- Light Gray
- Brown
- Light Red
- Light Green
- Light Blue
- Light Cyan
- Light Magenta
- White

DIALOG

Set this keyword to have the text annotation dialog appear. This dialog will fill in known attributes from set keywords.

ENABLE_FORMATTING

Set this keyword to have LIVE_TEXT interpret “!” (exclamation mark) as font and positioning commands.

ERROR

Set this keyword to a named variable to contain the returned error message (string). An empty string is returned if no errors occurred during the operation. By default, errors are reported via a GUI.

Note

If a named variable is passed in this keyword and an error occurs, the error GUI will *not* be displayed.

FONTNAME

Set this keyword to a string containing the name of the desired font. The default is Helvetica.

FONTSIZE

Set this keyword to an integer scalar specifying the font point size to be used. The default is 12. Available point sizes are 9 through 72.

HIDE

Set this keyword to a boolean value indicating whether this item should be drawn:

- 0 = Draw (default)
- 1 = Do not draw

LOCATION

Set this keyword to a two-element, floating-point vector of the form [X, Y] specifying the location of the visualization (relative to the lower left hand corner within the visualization window) in normalized coordinates. The default is [0.5, 0.5].

Note

LOCATION may be adjusted to take into account window decorations.

NAME

Set this keyword equal to a string containing the name to be associated with this item. The name must be unique within the given window or buffer (WINDOW_IN). If not specified, a unique name will be assigned automatically.

NO_DRAW

Set this keyword to inhibit the visualization window from drawing. This is useful if multiple visualizations and/or annotations are being created via calls to other LIVE_Tools in order to reduce unwanted draws and help speed the display.

REFERENCE_OUT

Set this keyword to a variable to return a structure defining the names of the created items. The fields of the structure are shown in the following table:

Tag	Description
WIN	Window Name
VIS	Visualization Name
GRAPHIC	Graphic Name the text created

Table 2-38: Fields of the LIVE_TEXT Reference Structure

TEXTANGLE

Set this keyword to a floating-point value defining the angle of rotation of the text. The valid range is from 0.0 to 360.0. The default is 0.0.

VERTICAL_ALIGNMENT

Set this keyword to a floating-point value between 0.0 and 1.0 to indicate the vertical alignment of the text baseline. The alignment scheme is as follows:

0.0 Top

.

0.5 Middle

.

1.0 Bottom

VISUALIZATION_IN

Set this keyword equal to the name (string, case-insensitive) of a LIVE tool visualization. The VIS field from the REFERENCE_OUT keyword from the creation of the LIVE tool will provide the visualization name. If only one visualization is present in the window or buffer (WINDOW_IN), this keyword will default to it.

WINDOW_IN

Set this keyword equal to a name (string, case-sensitive) of a LIVE tool window or a LIVE tool buffer. The WIN tag of the REFERENCE_OUT structure from the creation of the LIVE tool will provide the window or buffer name. Window names are also visible in visualization window titlebars. If only one LIVE tool window (or buffer) is present in the IDL session, this keyword will default to it.

Examples

```
LIVE_TEXT, 'My Annotation', WINDOW_IN='Live Plot 2', $
   VISUALIZATION_IN='line plot visualization'
```

Version History

Introduced: 5.1

See Also

LIVE_LINE, LIVE_RECT

LJLCT

This routine is obsolete and should not be used in new IDL code.

The LJLCT procedure loads standard color tables for LJ-250/252 printer. The color tables are modified only if the device is currently set to “LJ”.

The default color maps used are for the 90 dpi color palette. There are only 8 colors available at 180 dpi.

If the current device is ‘LJ’, the !D.N_COLORS system variable is used to determine how many bit planes are in use (1 to 4). The standard color map for that number of planes is loaded. These maps are described in Chapter 7 of the *LJ250/LJ252 Companion Color Printer Programmer Reference Manual*, Table 7-5. That manual gives the values scaled from 1 to 100, LJLCT scales them from 0 to 255.

This routine is written in the IDL language. Its source code can be found in the file `ljlct.pro` in the `lib` subdirectory of the IDL distribution.

Syntax

LJLCT

Example

```
; Set plotting to the LJ device:
SET_PLOT, 'LJ'

; Load the LJ color tables:
LJLCT
```

MSG_CAT_CLOSE

The MSG_CAT_CLOSE procedure closes a catalog file from the stored cache.

Syntax

MSG_CAT_CLOSE, *object*

Arguments

object

The object reference returned from MSG_CAT_OPEN.

Keywords

None

Version History

Introduced: 5.2.1

See Also

MSG_CAT_COMPILE, MSG_CAT_OPEN, IDLffLanguageCat

MSG_CAT_COMPILE

The MSG_CAT_COMPILE procedure creates an IDL language catalog file.

Note

The locale is determined from the system locale in effect when compilation takes place.

Syntax

MSG_CAT_COMPILE, *input*[, *output*] [, LOCALE_ALIAS=*string*] [, /MBCS]

Arguments

input

The input file with which to create the catalog. The file is a text representation of the key/MBCS association. Each line in the file must have a key. The language string must then be surrounded by double quotes, then an optional comment.

For example:

VERSION "Version 1.0" My revision number of the file

There are 2 special tags, one of which must be included when creating the file:

APPLICATION (required)

SUB_QUERY (optional)

output

The optional output file name (including path if necessary) of the IDL language catalog file.

The naming convention for IDL language catalog files is as follows:

```
idl_ + "Application name" + _ + "Locale" + .cat
```

For example:

```
idl_envi_usa_eng.cat
```

If not set, a default filename is used based on the locale:

```
idl_[locale].cat
```

Keywords

LOCALE_ALIAS

Set this keyword to a scalar string containing any locale aliases for the locale on which the catalog is being compiled. A semi-colon is used to separate locales.

For example:

```
MSG_CAT_COMPILE,'input.txt', 'idl_envi_usa_eng.cat',$
LOCALE_ALIAS='C'
```

MBCS

If set, this procedure assumes language strings to be in MBCS format. The default is 8-bit ASCII.

Version History

Introduced: 5.2.1

See Also

MSG_CAT_CLOSE, MSG_CAT_OPEN, IDLffLanguageCat

MSG_CAT_OPEN

The MSG_CAT_OPEN function opens a specified catalog object file.

Syntax

Result = MSG_CAT_OPEN(*application* [, DEFAULT_FILENAME=*filename*] [, FILENAME=*string*] [, FOUND=*variable*] [, LOCALE=*string*] [, PATH=*string*] [, SUB_QUERY=*value*])

Return Value

Returns a catalog object for the given parameters if found. If a match is not found, an unset catalog object is returned. If unset, the IDLffLanguageCat::Query method will always return the empty string unless a default catalog is provided.

Arguments

application

A scalar string representing the name of the desired application's catalog file.

Keywords

DEFAULT_FILENAME

Set this keyword to a scalar string containing the full path and filename of the catalog file to open if the initial request was not found.

FILENAME

Set this keyword to a scalar string containing the full path and filename of the catalog file to open. If this keyword is set, *application*, PATH and LOCALE are ignored.

FOUND

Set this keyword to a named variable that will contain 1 if a catalog file was found, 0 otherwise.

LOCALE

Set this keyword to the desired locale for the catalog file. If not set, the current locale is used.

PATH

Set this keyword to a scalar string containing the path to search for language catalog files. The default is the current directory.

SUB_QUERY

Set this keyword equal to the value of the SUB_QUERY key to search against. If a match is found, it is used to further sub-set the possible return catalog choices.

Version History

Introduced: 5.2.1

See Also

MSG_CAT_CLOSE, MSG_CAT_COMPILE, IDLffLanguageCat

PICKFILE

This routine is obsolete and should not be used in new IDL code.

The PICKFILE function has been renamed but retains the same functionality it had in previous releases. See DIALOG_PICKFILE in the *IDL Reference Guide*.

POLYFITW

This routine is obsolete and should not be used in new IDL code. To perform a weighted polynomial fit, use the MEASURE_ERRORS keyword to POLY_FIT.

The POLYFITW function performs a weighted least-square polynomial fit with optional error estimates and returns a vector of coefficients with a length of *NDegree*+1.

The POLYFITW routine uses matrix inversion. A newer version of this routine, SVDFIT, uses Singular Value Decomposition. The SVD technique is more flexible, but slower. Another version of this routine, POLY_FIT, performs a least square fit without weighting.

This routine is written in the IDL language. Its source code can be found in the file `polyfitw.pro` in the `lib` subdirectory of the IDL distribution.

Syntax

Result = POLYFITW(*X*, *Y*, *Weights*, *NDegree* [, *Yfit*, *Yband*, *Sigma*, *Corrm*] [, /DOUBLE] [, STATUS=*variable*])

Arguments

X

An *n*-element vector of independent variables.

Y

A vector of independent variables, the same length as *X*.

Weights

A vector of weights, the same length as *X* and *Y*.

NDegree

The degree of the polynomial to fit.

Yfit

A named variable that will contain the vector of calculated *Y* values. These values have an error of plus or minus *Yband*.

Yband

A named variable that will contain the error estimate for each point.

Sigma

A named variable that will contain the standard deviation of the returned coefficients.

Corrm

A named variable that will contain the correlation matrix of the coefficients.

Keywords

DOUBLE

Set this keyword to force computations to be done in double-precision arithmetic.

STATUS

Set this keyword to a named variable to receive the status of the operation. Possible status values are:

- 0 = Successful completion.
- 1 = Singular array (which indicates that the inversion is invalid). *Result* is NaN.
- 2 = Warning that a small pivot element was used and that significant accuracy was probably lost.
- 3 = Undefined (NaN) error estimate was encountered.

Note

If STATUS is not specified, any error messages will be output to the screen.

Tip

Status values of 2 or 3 can often be resolved by setting the DOUBLE keyword.

REWIND

This routine is obsolete and should not be used in new IDL code.

The REWIND procedure rewinds the tape on the designated IDL tape unit. REWIND is available only under VMS. See the description of the magnetic tape routines in "VMS-Specific Information" in Chapter 8 of *Building IDL Applications*.

Syntax

REWIND, *Unit*

Arguments

Unit

The magnetic tape unit to rewind. *Unit* must be a number between 0 and 9, and should not be confused with standard file Logical Unit Numbers (LUNs).

RIEMANN

This routine is obsolete and should not be used in new IDL code. RIEMANN has been replaced by the RADON function.

The RIEMANN procedure computes the “Riemann sum” (or its inverse) which helps implement the backprojection operator used to reconstruct the cross-section of an object, given projections through the object from multiple directions. This technique is widely used in medical imaging in the fields of computed x-ray tomography, MRI imaging, Positron Emission Tomography (PET), and also has applications in other areas such as seismology and astronomy. The inverse Riemann sum, which evaluates the projections given a slice through an object, is also a discrete approximation to the Radon transform.

Given a matrix *A*(*m*,*n*), which will contain the reconstructed slice; a vector *P*, containing the ray sums for a given view; and an angle *Theta* measured in radians from the vertical: the Riemann sum “backprojects” the vector *P* into *A*. For each element of *A*, the value of the closest element of *P* is summed, leaving the result in *A*. Bilinear interpolation is an option. All operations are performed in single-precision floating point.

In the reverse operation, the ray sums contained in the view vector, *P*, are computed given the original slice, *A*, and *Theta*. This is sometimes called “front projection”.

The Riemann sum can be written:

$$\sum_{i=0}^{M-1} A(r \cdot \cos(i \cdot \Delta - \theta), i \cdot \Delta)$$

which is the sum of the data along lines through an image with an angle of theta from the vertical.

Syntax

RIEMANN, *P*, *A*, *Theta* [, /BACKPROJECT] [, /BILINEAR] [, CENTER=*value*] [, COR=*vector*] [, CUBIC=*value*{-1 to 0}] [, D=*spacing*] [, ROW=*value*]

Arguments

P

A *k*-element floating-point projection vector (or matrix if the ROW keyword is specified). For backprojection (when the BACKPROJECT keyword is set), *P* contains the ray sums for a single view. For the inverse operation, *P* should contain zeros on input and will contain the ray sums for the view on output.

A

An *m* by *n* floating-point image matrix. For backprojection, *A* contains the accumulated results. For the inverse operation, *A* contains the original image. Typically, *k* should be larger than

$$\sqrt{m^2 + n^2}$$

which is the diagonal size of *A*.

Theta

The angle of the ray sums from the vertical.

Keywords

BACKPROJECT

Set this keyword to perform backprojection in which *P* is summed into *A*. If this keyword is not set, the inverse operation occurs and the ray sums are accumulated into *P*.

BILINEAR

Set this keyword to use bilinear interpolation rather than the default nearest neighbor sampling. Results are more accurate but slower when bilinear interpolation is used.

CENTER

Set this keyword equal to a floating-point number specifying the center of the projection. The default value for CENTER is one-half the number of elements of *P*.

COR

Set this keyword equal to a two-element floating-point vector specifying the center of rotation in the array *A*. The default value is [*m*/2., *n*/2.], where *A* is an *m* by *n* array.

For symmetric results, given symmetric operands, COR should be set to the origin of symmetry [(*m*-1)/2, (*n*-1)/2], and CENTER should be set to (*n*-1)/2., where *n* is the number of elements in the projection vector, *P*.

CUBIC

Set this keyword to a value between -1 and 0 to use the cubic convolution interpolation method with the specified value as the interpolation parameter. Setting this keyword equal to a value greater than zero specifies a value of -1 for the interpolation parameter. Park and Schowengerdt (see reference below) suggest that a value of -0.5 significantly improves the reconstruction properties of this algorithm.

Cubic convolution is an interpolation method that closely approximates the theoretically optimum sinc interpolation function using cubic polynomials. According to sampling theory, details of which are beyond the scope of this document, if the original signal, *f*, is a band-limited signal, with no frequency component larger than ω_0, and *f* is sampled with spacing less than or equal to $1/2\omega_0$, then *f* can be reconstructed by convolving with a sinc function: sinc (x) = sin (πx) / (πx).

In the one-dimensional case, four neighboring points are used, while in the two-dimensional case 16 points are used. Note that cubic convolution interpolation is significantly slower than bilinear interpolation.

For further details see:

Rifman, S.S. and McKinnon, D.M., “Evaluation of Digital Correction Techniques for ERTS Images; Final Report”, Report 20634-6003-TU-00, TRW Systems, Redondo Beach, CA, July 1974.

S. Park and R. Schowengerdt, 1983 “Image Reconstruction by Parametric Cubic Convolution”, Computer Vision, Graphics & Image Processing 23, 256.

D

Use this keyword to specify the spacing between elements of *P*, expressed in the same units as the spacing between elements of *A*. The default is 1.0.

ROW

Set this keyword to specify the *P* vector as a given row within a matrix, so that the sinogram array can be used directly without having to extract or insert each row. In this case, *P* must be an array with a first dimension equal to *k*, and the value of ROW must be in the range of 0 to the number of vectors of length *k* in *P*, minus one.

Example

This example forms a synthetic image in *A*, computes *Nviews* equally spaced views, and stores the stacked projections (commonly called the “sinogram”) in a matrix PP. It then backprojects the projections into the matrix B, forming the reconstructed slice. In practical use, the projections are convolved with a filter before being backprojected.

```
; Define number of columns in A:
N = 100L

; Define number of rows in A:
M = 100L
; Number of views:
nviews = 100

; The length of the longest projection. If filtered backprojection
; is used, 1/2 the length of the convolution kernel must also be
; added.

K = CEIL(SQRT(N^2 + M^2))

; Form original slice:
A = FLTARR(N, M)

; Simulate a square object:
A[N/2:N/2+5, M/2:M/2+5] = 1.0

; Make array for sinogram:
pp = FLTARR(K, nviews)

; Compute each view:
FOR I=0, NVIEWS-1 DO RIEMANN, pp, A, I * !PI/nviews, ROW=i

; Show sinogram:
TVSCL, pp

; Initial reconstructed image:
B = FLTARR(N,M)
```

```
; Do the backprojection for each view:
FOR I=0, nviews-1 DO $
   RIEMANN, pp, B, I * !PI/nviews, /BACKPROJECT, ROW=i

; Show reconstructed array:
TVSCL, B
```

RSTRPOS

This routine is obsolete and should not be used in new IDL code.

The RSTRPOS function has been replaced by the STRPOS function's REVERSE_SEARCH keyword. See "STRPOS" in the *IDL Reference Guide* manual.

The RSTRPOS function finds the *last* occurrence of a substring within an object string (the STRPOS function finds the first occurrence of a substring). If the substring is found in the expression, RSTRPOS returns the character position of the match, otherwise it returns -1.

Syntax

Result = RSTRPOS(*Expression*, *Search_String* [, *Pos*])

Arguments

Expression

The expression string in which to search for the substring.

Search_String

The substring to be searched for within *Expression*.

Pos

The character position before which the search is begun. If *Pos* is omitted, the search begins at the last character of *Expression*.

Example

```
; Define the expression:
exp = 'Holy smokes, Batman!'
; Find the position of a substring:
pos = RSTRPOS(exp, 'smokes')
; Print the substring's position:
PRINT, pos
```

IDL prints:

```
5
```

Note

Substring begins at position 5 (the sixth character).

SET_SYMBOL

This routine is obsolete and should not be used in new IDL code.

The SET_SYMBOL procedure defines a DCL (Digital Command Language) interpreter symbol for the current process. SET_SYMBOL is available only under VMS.

Syntax

SET_SYMBOL, *Name*, *Value* [, TYPE={1 | 2}]

Arguments

Name

A scalar string containing the name of the symbol to be defined.

Value

A scalar string containing the value with which *Name* is defined.

Keywords

TYPE

Indicates the table into which *Name* will be defined. Setting TYPE to 1 specifies the local symbol table, while a value of 2 specifies the global symbol table. The default is the local table.

SETLOG

This routine is obsolete and should not be used in new IDL code.

The SETLOG procedure defines a logical name.

Note

This procedure is only available for the VMS platform.

Syntax

SETLOG, *Lognam*, *Value* [, /CONCEALED] [, /CONFINE] [, /NO_ALIAS] [, TABLE=*string*] [, /TERMINAL]

Arguments

Lognam

A scalar string containing the name of the logical to be defined.

Value

A string containing the value to which the logical will be set. If *Value* is a string array, *Lognam* is defined as a multi-valued logical where each element of *Value* defines one of the equivalence strings.

Keywords

CONCEALED

If this keyword is set, RMS (VMS Record Management Services) interprets the equivalence name as a device name.

CONFINE

If this keyword is set, the logical name is not copied from the IDL process to its spawned subprocesses.

NO_ALIAS

If this keyword is set, the logical name cannot be duplicated in the same logical table at an outer access mode. If another logical name with the same name already exists at

an outer access mode, it is deleted. See the *VMS System Services Manual* for additional information on logical names and access modes.

TABLE

A scalar string containing the name of the logical table into which *Lognam* will be entered. If TABLE is not specified, LNM$PROCESS_TABLE is used.

TERMINAL

If this keyword is set, when attempting to translate the logical, further iterative logical name translation on the equivalence name is not to be performed.

SIZE Executive Command

This command is obsolete and is should not be used in new IDL code.

.SIZE *Code_Size, Data_Size*

The `.SIZE` command resizes the memory area used to compile programs. The default code and data area sizes are 32,768 and 8,192 bytes, respectively. These sizes represent a compromise between an unlimited program space and conservation of memory. User procedures and functions are compiled in this large program area. After successful compilation, a new memory area of the required size is allocated to contain the newly compiled program unit.

Resizing the code and data areas erases the currently compiled main program and all main program variables. For example, to extend the code and data areas to 30,000 and 5,000 bytes, respectively, use the following statement:

```
.SIZE 30000 5000
```

Each user-defined procedure, function, and main program has its own code area that contains the compiled code and constants. Although the maximum size of these areas is set by the `.SIZE` command, there is virtually no limit to the number of program units. Procedures or functions that run out of code area space should be broken into multiple program units.

The data area contains information describing the user-defined variables and common blocks for each procedure, function, or main program. Note that the “data area” is not the space available for variable storage, but the space available for that program unit’s symbol table.

Warning

Users are sometimes confused about the nature of the code and data areas. Note that there are separate code and data areas for each compiled function, routine, or main program. The HELP command can be used to see the current sizes of the code and data areas for the program unit in which the HELP function is called.

For example, to see the sizes of the code and data areas for the main program level, enter the following at the IDL prompt:

```
HELP
```

Each compiled function and procedure has its own code and data areas. If the compiled routine does not use the full amount of code space allocated by the default

code area size, the code area “shrinks” to just the size the routine needs. For example, enter and compile a simple procedure from the IDL prompt by entering:

```
.RUN
- PRO EXAMPLE
- PRINT, "Here are the code and data areas for this procedure:"
- HELP
- END
```

Call the EXAMPLE procedure from the command line to see the result:

```
EXAMPLE
```

The third line of output from the HELP procedure displays:

```
Code area used: 100.00% (100/100), Data area used: 2.02% (2/99)
```

Note that the code area for the EXAMPLE procedure is completely filled and that the total size of the code area is just 100 bytes.

SKIPF

This routine is obsolete and should not be used in new IDL code.

The SKIPF procedure skips records or files on the designated magnetic tape unit. SKIPF is available only under VMS. If two parameters are supplied, files are skipped. If three parameters are present, individual records are skipped.

The number of files or records actually skipped is stored in the system variable !ERR. Note that when skipping records, the operation terminates immediately when the end of a file is encountered. See the description of the magnetic tape routines in "VMS-Specific Information" in Chapter 8 of *Building IDL Applications*.

Syntax

SKIPF, *Unit*, *Files*

or

SKIPF, *Unit*, *Records*, *R*

Arguments

Unit

The magnetic tape unit to rewind. *Unit* must be a number between 0 and 9, and should not be confused with the standard file Logical Unit Numbers (LUNs).

Files

The number of files to be skipped. Skipping is in the forward direction if the second parameter is positive, otherwise files are skipped backwards.

Records

The number of records to be skipped. Skipping is in the forward direction if the second parameter is positive, otherwise records are skipped backwards.

R

If this argument is present, records are skipped, otherwise files are skipped. The value of *R* is never examined. Its presence serves only to indicate that records are to be skipped.

SLICER

This routine is obsolete and should not be used in new IDL code.

The IDL SLICER is a widget-based application to show 3D volume slices and isosurfaces. On exit, the Z-buffer contains the most recent image generated by the SLICER. The image may be redisplayed on a different device by reading the Z-buffer contents plus the current color table. Note that the volume data must fit in memory.

Using the SLICER

Data is passed to the SLICER via the common block VOLUME_DATA. Note that the variable used to contain the volume data must be defined as part of the common block *before* the volume data is read into the variable. (See the *Example* section, below.)

The SLICER has the following modes:

- Slices: Displays or removes orthogonal or oblique slices through the data volume.
- Block: Displays the surfaces of a selected block inside the volume.
- Cutout: Cuts blocks from previously drawn objects.
- Isosurface: Draws an isosurface contour.
- Probe: Displays the position and value of objects using the mouse.
- Colors: Manipulates the color tables and contrast.
- Rotations: Sets the orientation of the display.
- Journal: Records or plays back files of SLICER commands.

See the SLICER's help file (available by clicking the "Help" button on the SLICER widget) for more information about drawing slices and images.

Syntax

COMMON VOLUME_DATA, A

A = *your_volume_data*

SLICER

Arguments

A

A 3D array containing volume data. Note that the variable *A* must be included in the common block VOLUME_DATA *before* being equated with the volume data. *A* is *not* an explicit argument to SLICER.

Keywords

CMD_FILE

Set this keyword to a string that contains the name of a file containing SLICER commands to execute as described under *SLICER Commands*, below. The file should contain one command per line.

Command files can be created interactively, using the SLICER's "Journal" feature.

COMMAND

Set this keyword equal to a 1 x *n* string array containing commands to be executed by the SLICER before entering interactive mode. Available commands are described under *SLICER Commands*, below.

Note that commands passed to the SLICER with the COMMAND keyword must be in a 1 x *n* array, rather than in an *n*-element vector. String arrays can be easily specified in the proper format using the TRANSPOSE command. For example, the following passes three commands to the slicer:

```
com=TRANSPOSE(['COLOR 5', 'TRANS 1 20', 'ISO 17 1'])
SLICER, COMMAND=com
```

DETACHED

Set this keyword to put the drawable in a separate window. This can be useful when working with large images.

GROUP

Set this keyword to the widget ID of the widget that calls SLICER. When GROUP is specified, a command to destroy the calling widget also destroys the SLICER.

NO_BLOCK

Set this keyword equal to zero to have XMANAGER *block* when this application is registered. By default, NO_BLOCK is set equal to one, providing access to the command line if active command line processing is available. Setting NO_BLOCK=0 will cause *all* widget applications to block, not just this application. For more information, see the documentation for the NO_BLOCK keyword to XMANAGER.

RANGE

Set this keyword to a two-element array containing minimum and maximum data values of interest. If RANGE is omitted, the data is scanned for the minimum and maximum values.

RESOLUTION

Set this keyword to a two-element vector specifying the width and height of the drawing window. The default is 55% by 44% of the screen width.

SLICER Commands

The slicer accepts a number of commands that replicate the action of controls in the graphical user interface. These commands can be specified at the IDL command line using either CMD_FILE keyword or the COMMAND keyword. Files of SLICER commands can also be created and played back from within the SLICER, using the “Journal” feature.

Commands, in this context, are strings that include a command identifier and (in some cases) one or more numeric parameters separated by blanks. The following are the available SLICER commands, with parameters.

COLOR *Table_Index Low High Shading*

Set the color tables. *Table_Index* is the pre-defined color table number (see LOADCT), or -1 to retain the present table. *Low* is the contrast minimum, *High* is the contrast maximum, and *Shading* is the differential shading, all expressed in percent. For example, the following command picks color table number 2, sets the minimum contrast to 10%, the maximum contrast to 90%, and the differential shading to 50%:

```
COLOR 2 10 90 50
```

CUBE *Mode Cut_Ovr Interp X0 Y0 Z0 X1 Y1 Z1*

Defines the volume used for “Block” and “Cutout” operations. Set *Mode*=1 for Block mode or *Mode*=2 for Cutout mode. Set *Cut_Ovr*=0 to mimic selecting the “Cut Into” button or *Cut_Ovr*=1 to mimic selecting the “Cut Over” button.

Note

These buttons have no effect in Block mode. See the online help on SLICER for further explanation of Cut Into and Cut Over.

Set *Interp*=1 for bilinear interpolation sampling or *Interp*=0 for nearest neighbor sampling.

X0,*Y0*,*Z0* are the coordinates of the lower corner of the volume, and *X1*,*Y1*,*Z1* are the coordinates of the upper corner. For example:

```
CUBE 1 0 1 20 0 56 60 75 42
```

selects Block mode, the “Cut Into” button, bilinear interpolation and defines the volume’s corners at (20, 0, 56) and (60, 75, 42).

ERASE

Erases the display. Mimics clicking on the “Erase” button.

ISO *Threshold Hi_Lo*

Draws an iso-surface. *Threshold* is the isosurface threshold value. Set *Hi_Lo* equal to 1 to view the low side, or equal to 0 to view the high side.

ORI *X_Axis Y_Axis Z_axis X_Rev Y_Rev Z_Rev X_Rot Z_Rot Asp*

Sets the orientation for the SLICER display, mimicking the action of the “Orientation” button. Set *X_Axis*, *Y_Axis*, and *Z_Axis* to 0, 1, or 2, where 0 represents the data X axis, 1 the data Y axis, and 2 the data Z axis. Set *X_Rev*, *Y_Rev*, and *Z_Rev* to 0 for normal orientation or to 1 for reversed. Set *X_Rot* and *Z_Rot* to the desired rotations of the X and Z axes, in degrees (30 is the default). Set *Asp* to the desired Z axis aspect ratio with respect to X and Y. For example, to interchange the X and Z axes and reverse the Y use the string:

```
ORI 2 1 0 0 1 0 30 30 1
```

SLICE *Axis Value Interp Expose 0*

Draws an orthogonal slice. Set *Axis* to 0 to draw a slice parallel to the X axis, to 1 for the Y axis, or to 2 for the Z axis. Set *Value* to the pixel value of the slice. Set *Interp*=1

for bilinear interpolation sampling or *Interp*=0 for nearest neighbor sampling. Set *Expose*=1 to cut out of an existing image (mimicking the “Expose” button) or set *Expose*=0 to draw the slice on top of the current display (mimicking the “Draw” button). The final zero indicates that the slice is orthogonal rather than oblique. For example, the following command draws an orthogonal slice parallel to the X axis, at the pixel value 31, using bilinear interpolation.

```
SLICE 0 31 1 0 0
```

SLICE *Azimuth Elev Interp Expose 1 X0 Y0 Z0*

Draws an oblique slice. The oblique plane crosses the XY plane at angle *Azimuth*, with an elevation of *Elev*. Set *Interp*=1 for bilinear interpolation sampling or *Interp*=0 for nearest neighbor sampling. Set *Expose*=1 to cut out of an existing image (mimicking the “Expose” button) or set *Expose*=0 to draw the slice on top of the current display (mimicking the “Draw” button). The one indicates that the slice is oblique rather than orthogonal. The plane passes through the point (*X0*, *Y0*, *Z0*). For example, the following command exposes an oblique slice with an azimuth of 42 and an elevation of 24, using bilinear interpolation. The plane passes through the point (52, 57, 39).

```
SLICE 42 24 1 1 1 52 57 39
```

TRANS *On_Off Threshold*

Turns transparency on or off and sets the transparency threshold value. Set *On_Off*=1 to turn transparency on, *On_Off*=0 to turn transparency off. *Threshold* is expressed in percent of data range (0 = minimum data value, 100 = maximum data value). For example, this command turns transparency on and sets the threshold at 20 percent:

```
TRANS 1 20
```

UNDO

Undoes the previous operation.

WAIT Secs

Causes the SLICER to pause for the specified time, in seconds.

Example

Data is transferred to the SLICER via the VOLUME_DATA common block instead of as an argument. This technique is used because volume datasets can be very large

and the duplication that occurs when passing values as arguments is a waste of memory.

Suppose that you want to read some data from the file `head.dat`, which is included in the IDL examples directory, into IDL for use in the SLICER. Before you read the data, establish the VOLUME_DATA common block with the following command:

```
COMMON VOLUME_DATA, VOL
```

The VOLUME_DATA common block has just one variable in it. (The variable can have any name; here, we're using the name `VOL`.) Now read the data from the file into `VOL`. For example:

```
OPENR, UNIT, /GET, FILEPATH('head.dat', SUBDIRECTORY=['examples',
'data'])
VOL = BYTARR(80, 100, 57, /NOZERO)
READU, UNIT, VOL
CLOSE, UNIT
```

Now you can run the SLICER widget application by entering:

```
SLICER
```

The data stored in VOL is the data being worked on by the SLICER.

To obtain the image in the slicer window after slicer is finished:

```
SET_PLOT, 'Z'Use the Z buffer graphics device.
A = TVRD()Read the image.
```

STR_SEP

This routine is obsolete and should not be used in new IDL code.

The STR_SEP function has been replaced by STRSPLIT for single character delimiters, and STRSPLIT with the REGEX keyword set for longer delimiters. See "STRSPLIT" in the *IDL Reference Guide* manual.

The STR_SEP function divides a string into pieces as designated by a separator string. STR_SEP returns a string array where each element is a separated piece of the original string.

Syntax

Result = STR_SEP(*Str*, *Separator* [, /TRIM] [, /REMOVE_ALL] [, /ESC])

Arguments

Str

The string to be separated.

Separator

The separator string.

Keywords

TRIM

Set this keyword to remove leading and trailing blanks from each element of the returned string array. TRIM performs STRTRIM(*String*, 2).

REMOVE_ALL

Set this keyword to remove all blanks from each element of the returned string array. REMOVE_ALL performs STRCOMPRESS(*String*, /REMOVE_ALL)

ESC

Set this keyword to interpret the characters following the <ESC> character literally and not as separators. For example, if the separator is a comma and the escape

character is a backslash, the character sequence “a\,b” is interpreted as a single field containing the characters “a,b”.

Example

```
; Create a string:
str = 'Doug.is.a.cool.dude!'

; Separate the parts between the periods:
parts = STR_SEP(str, '.')

; Confirm that the string has been broken up into 5 elements:
HELP, parts

PRINT, parts[3]
```

IDL Output

```
PARTS   STRING = Array[5]
cool
```

TAPRD

This routine is obsolete and should not be used in new IDL code.

The TAPRD procedure reads the next record on the selected tape unit into the specified array. TAPRD is available only under VMS. No data or format conversion, with the exception of optional byte reversal, is performed. The array must be defined with the desired type and dimensions. If the read is successful, the system variable !ERR is set to the number of bytes read. See the description of the magnetic tape routines in "VMS-Specific Information" in Chapter 8 of *Building IDL Applications*.

Syntax

TAPRD, *Array*, *Unit* [, *Byte_Reverse*]

Arguments

Unit

The magnetic tape unit to read. This argument must be a number between 0 and 9, and should not be confused with standard file Logical Unit Numbers (LUN's).

Array

A named variable into which the data is read. If *Array* is larger than the tape record, the extra elements of the array are not changed. If the array is shorter than the tape record, a data overrun error occurs. The length of *Array* and the records on the tape can range from 14 bytes to 65,235 bytes.

Byte_Reverse

If this parameter is present, the even and odd numbered bytes are swapped after reading, regardless of the type of data or variables. This enables reading tapes containing short integers that were written on machines with different byte ordering. You can also use the BYTORDER routine to re-order different data types.

TAPWRT

This routine is obsolete and should not be used in new IDL code.

The TAPWRT procedure writes data from the *Array* parameter to the selected tape unit. TAPWRT is available only under VMS. One physical record containing the same number of bytes as the array is written each time TAPWRT is called. The parameters and usage are identical to those in the TAPRD procedure with the exception that here the *Array* parameter can be an expression. Consult the TAPRD procedure for details. See the description of the magnetic tape routines in "VMS-Specific Information" in Chapter 8 of *Building IDL Applications*.

Syntax

TAPWRT, *Array*, *Unit* [, *Byte_Reverse*]

Arguments

Unit

The magnetic tape unit to write. This argument must be a number between 0 and 9, and should not be confused with standard file Logical Unit Numbers (LUNs).

Array

The expression representing the data to be output. The length of *Array* and the records on the tape can range from 14 bytes to 65,235 bytes.

Byte_Reverse

If this parameter is present, the even and odd numbered bytes are swapped on output, regardless of the type of data or variables. This enables writing tapes that are compatible with other machines.

TIFF_DUMP

This routine is obsolete and should not be used in new IDL code.

The TIFF_DUMP procedure dumps the Image File Directories of a TIFF file directly to the terminal screen. Each TIFF Image File Directory entry is printed. This procedure is used mainly for debugging.

Note that not all of the tags have names encoded. In particular, Facsimile, Document Storage and Retrieval, and most no-longer-recommended fields are not encoded.

Syntax

TIFF_DUMP, *File*

Arguments

File

A scalar string containing the name of file to read.

TIFF_READ

This routine is obsolete and should not be used in new IDL code.

The TIFF_READ function has been renamed but retains the same functionality it had in previous releases. See READ_TIFF in the *IDL Reference Guide*.

The TIFF_READ function reads 8-bit or 24-bit images in TIFF format files (classes G, P, and R) and returns the image and color table vectors in the form of IDL variables. Only one image per file is read. TIFF_READ returns a byte array containing the image data. The dimensions of the result are the same as defined in the TIFF file (*Columns, Rows*).

For TIFF images that are RGB interleaved by pixel, the output dimensions are (*3, Columns, Rows*).

For TIFF images that are RGB interleaved by image, TIFF_READ returns the integer value zero, sets the variable defined by the PLANARCONFIG keyword to 2, and returns three separate images in the variables defined by the R, G, and B arguments.

Syntax

Result = TIFF_READ(*File [, R, G, B]*)

Arguments

File

A scalar string containing the name of file to read.

R, G, B

Named variables that will contain the Red, Green, and Blue color vectors extracted from TIFF Class P, Palette Color images. For TIFF images that are RGB interleaved by image (when the variable specified by the PLANARCONFIG keyword is returned as 2) the R, G, and B variables each hold an image with the dimensions (*Columns, Rows*).

Keywords

ORDER

Set this keyword to a named variable that will contain the order parameter from the TIFF File. This parameter is returned as 0 for images written bottom to top, and 1 for images written top to bottom. If the Orientation parameter does not appear in the TIFF file, an order of 1 is returned.

PLANARCONFIG

Set this keyword to a named variable that will contain the interleave parameter from the TIFF file. This parameter is returned as 1 for TIFF files that are GrayScale, Palette, or RGB color interleaved by pixel, or as 2 for RGB color TIFF files interleaved by image.

Example

Read the file `my.tif` in the current directory into the variable `image`, and save the color tables in the variables, `R`, `G`, and `B` by entering:

```
image = TIFF_READ('my.tif', R, G, B)
```

To view the image, load the new color table and display the image by entering:

```
TVLCT, R, G, B
TV, image
```

TIFF_WRITE

This routine is obsolete and should not be used in new IDL code.

The TIFF_WRITE procedure has been renamed but retains the same functionality it had in previous releases. See WRITE_TIFF in the *IDL Reference Guide*.

The TIFF_WRITE procedure writes 8- or 24-bit images to a TIFF file. Files are written in a single strip, or in three strips when the PLANARCONFIG keyword is set to 2.

Syntax

TIFF_WRITE, *File, Array [, Orientation]*

Arguments

File

A scalar string containing the name of file to create.

Array

The image data to be written. If not already a byte array, it is made a byte array. Array may be either an (*n*, *m*) array for Grayscale or Palette classes, or a (3, *n*, *m*) array for RGB full color, interleaved by image. If the PLANARCONFIG keyword is set to 2 then the *Array* parameter is ignored (and may be omitted).

Orientation

This parameter should be 0 if the image is stored from bottom-to-top (the default). For images stored from top-to-bottom, this parameter should be 1.

Warning: not all TIFF readers are capable of reversing the scan line order. If in doubt, first convert the image to top-to-bottom order (use the REVERSE function), and set *Orientation* to 1.

Keywords

RED, GREEN, BLUE

If you are writing a Class P, Palette color image, set these keywords equal to the color table vectors, scaled from 0 to 255.

If you are writing an image that is RGB interleaved by image (i.e., if the PLANARCONFIG keyword is set to 2), set these keywords to the names of the variables containing the 3 color component image.

PLANARCONFIG

Set this keyword to 2 if writing an RGB image that is contained in three separate images (color planes). The three images must be stored in variables specified by the RED, GREEN, and BLUE keywords. Otherwise, omit this parameter (or set it to 1).

XRESOL

The horizontal resolution, in pixels per inch. The default is 100.

YRESOL

The vertical resolution, in pixels per inch. The default is 100.

Examples

Four types of TIFF files can be written:

TIFF Class G, Grayscale.

The variable `array` contains the 8-bit image array. A value of 0 is black, 255 is white. The Red, Green, and Blue keywords are omitted.

```
TIFF_WRITE, 'a.tif', array
```

TIFF Class P, Palette Color

The variable `array` contains the 8-bit image array. The keyword parameters RED, GREEN, and BLUE contain the color tables, which can have up to 256 elements, scaled from 0 to 255.

```
TIFF_WRITE, 'a.tif', array, RED = r, GREEN = g, BLUE = b
```

TIFF Class R, RGB Full Color, color interleaved by pixel

The variable `array` contains the byte data, and is dimensioned (*3, cols, rows*).

```
TIFF_WRITE, 'a.tif', array
```

TIFF Class R, RGB Full Color, color interleaved by image

Input is three separate images, provided in the keyword parameters RED, GREEN, and BLUE. The input argument *Array* is ignored. The keyword PLANARCONFIG must be set to 2 in this case.

```
TIFF_WRITE, 'a.tif', RED = r, GREEN = g, BLUE = b, PLAN = 2
```

TRNLOG

This routine is obsolete and should not be used in new IDL code.

The TRNLOG function searches the VMS logical name tables for a specified logical name and returns the equivalence string(s) in an IDL variable. TRNLOG is available only under VMS. TRNLOG also returns the VMS status code associated with the translation as a longword value. As with all VMS status codes, success is indicated by an odd value (least significant bit is set) and failure by an even value.

Syntax

Result = TRNLOG(*Lognam*, *Value* [, ACMODE={0 | 1 | 2 | 3}] [, /FULL_TRANSLATION] [, /ISSUE_ERROR] [, RESULT_ACMODE=*variable*] [, RESULT_TABLE=*variable*] [, TABLE=*string*])

Arguments

Lognam

A scalar string containing the name of the logical to be translated.

Value

A named variable into which the equivalence string is placed. If Lognam has more than one equivalence string, the first one is used. The FULL_TRANSLATION keyword can be used to obtain all equivalence strings.

Keywords

ACMODE

Set this keyword to a value specifying the access mode to be used in the translation. Valid values are:

- 0 = Kernal
- 1 = Executive
- 2 = Supervisor
- 3 = User

When you specify the ACMODE keyword, all names at access modes less privileged than the specified mode are ignored. If you do not specify ACMODE, the translation

proceeds without regard to access mode. However, the search proceeds from the outermost (User) to the innermost (Kernal) mode. Thus, if two logical names with the same name but different access modes exist in the same table, the name with the outermost access mode is used.

FULL_TRANSLATION

Set this keyword to obtain the full set of equivalence strings for *Lognam*. By default, when translating a multivalued logical name, *Value* only receives the first equivalence string as a scalar value. When this keyword is set, *Value* instead returns a string array. Each element of this array contains one of the equivalence strings. For example, under recent versions of VMS, the SYS$SYSROOT logical can have multiple values. To see these values from within IDL, enter:

```
; Translate the logical:
ret = TRNLOG('SYS$SYSROOT', trans, /FULL, /ISSUE_ERROR)
; View the equivalence strings:
PRINT, trans
```

ISSUE_ERROR

Set this keyword to issue an error message if the translation fails. Normally, no error is issued and the user must examine the return value to determine if the operation failed.

RESULT_ACMODE

If present, this keyword specifies a named variable in which to place the access mode of the translated logical. The access modes are summarized above.

RESULT_TABLE

If present, this keyword specifies a named variable. The name of the logical table containing the translated logical is placed in this variable as a scalar string.

TABLE

A scalar string giving the name of the logical table in which to search for *Lognam*. If TABLE is not specified, the standard VMS logical tables are searched until a match is found, starting with LNM$PROCESS_TABLE and ending with LNM$SYSTEM_TABLE.

VAX_FLOAT

This routine is obsolete and should not be used in new IDL code.

The VAX_FLOAT function performs one of two possible actions:

1. Determine, and optionally change, the default value for the VAX_FLOAT keyword to the OPEN procedures.
2. Determine if an open file unit has the VAX_FLOAT attribute set.

Syntax

Result = VAX_FLOAT([*Default*] [, FILE_UNIT=*lun*])

Arguments

Default

Default is used to change the default value of the VAX_FLOAT keyword to the OPEN procedures. A value of 0 (zero) makes the default for those keywords False. A non-zero value makes the default True. Specifying *Default* in conjunction with the FILE_UNIT keyword will cause an error.

Note

If the FILE_UNIT keyword is *not* specified, the value returned from VAX_FLOAT is the default value *before* any change is made. This is the case even if *Default* is specified. This allows you to get the old setting and change it in a single operation.

Keywords

FILE_UNIT

Set this keyword equal to the logical file unit number (LUN) of an open file. VAX_FLOAT returns True (1) if the file was opened with the VAX_FLOAT attribute, or False (0) otherwise. Setting the FILE_UNIT keyword when the *Default* argument is specified will cause an error.

Example

To determine if the default VAX_FLOAT keyword value for OPEN is True or False:

```
default_vax_float = VAX_FLOAT()
```

To determine the current default value of the VAX_FLOAT keyword for OPEN and change it to True (1) in a single operation:

```
old_vax_float = VAX_FLOAT(1)
```

To determine if the file currently open on logical file unit 1 was opened with the VAX_FLOAT keyword set:

```
file_is_vax_float = VAX_FLOAT(FILE_UNIT=1)
```

WEOF

This routine is obsolete and should not be used in new IDL code.

The WEOF procedure writes an end of file mark, sometimes called a tape mark, on the designated tape unit at the current position. WEOF is available only under VMS. The tape must be mounted as a foreign volume. See "VMS-Specific Information" in Chapter 8 of *Building IDL Applications*.

Syntax

WEOF, *Unit*

Arguments

Unit

The magnetic tape unit on which the end of file mark is written. This argument must be a number between 0 and 9, and should not be confused with standard file Logical Unit Numbers (LUNs).

WIDED

This routine is obsolete and should not be used in new IDL code.

The WIDED procedure invokes IDL's graphical user interface designer, known as the Widget Builder. This functionality has been replaced by the GUIBuilder, which is documented in *Building IDL Applications*.

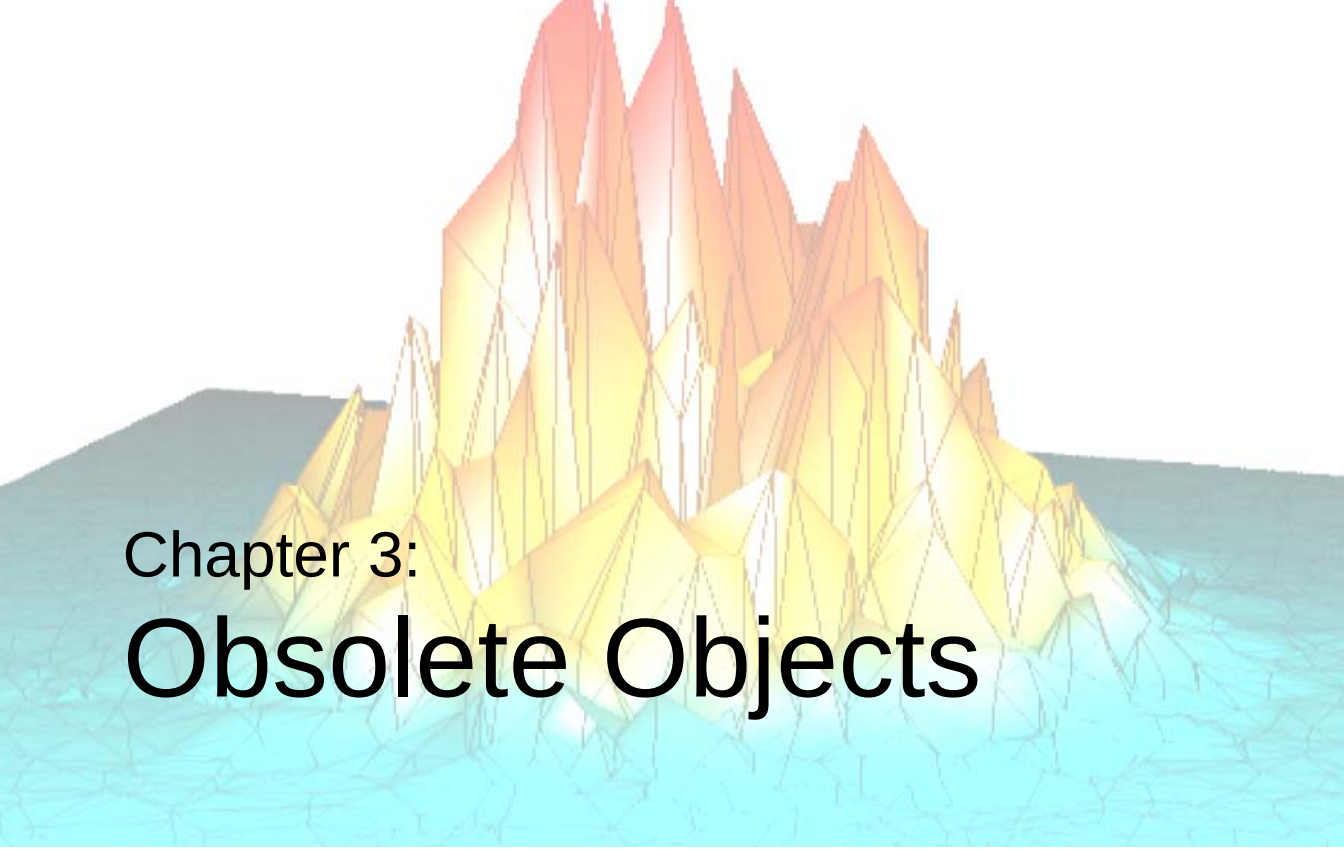
Syntax

WIDED

WIDGET_MESSAGE

This routine is obsolete and should not be used in new IDL code.

The WIDGET_MESSAGE function has been renamed but retains the same functionality it had in previous releases. See "DIALOG_MESSAGE" in the *IDL Reference Guide* manual.



Chapter 3: Obsolete Objects

This chapter contains complete documentation for obsoleted IDL objects. New IDL code should not use these routines. For a list of the routines that replace each of these obsolete objects, see Appendix I, “Obsolete Features” in the *IDL Reference Guide* manual.

IDLffLanguageCat

The IDLffLanguageCat object provides an interface to IDL language catalog files.

Note

This object is not savable. Restored IDLffLanguageCat objects may contain invalid data.

Note

This object is not intended to be created with OBJ_NEW. The MULTI function is used to return the correct object reference.

Superclasses

This class has no superclasses.

Creation

See MULTI.

Properties

Objects of this class have no properties of their own.

Methods

This class has the following methods:

- IDLffLanguageCat::IsValid
- IDLffLanguageCat::Query
- IDLffLanguageCat::SetCatalog

Version History

Introduced: 5.2.1

See Also

MSG_CAT_CLOSE, MSG_CAT_COMPILE, MULTI

IDLffLanguageCat Properties

Objects of this class have no properties of their own.

IDLffLanguageCat::IsValid

The IDLffLanguageCat::IsValid function method is used to determine whether the object has a valid catalog.

Syntax

Result = *Obj* ->[IDLffLanguageCat::]IsValid()

Return Value

Returns a 1 if the file is valid, 0 otherwise.

Arguments

None

Keywords

None

Version History

Introduced: 5.2.1

IDLffLanguageCat::Query

The IDLffLanguageCat::Query function method is used to return the language string associated with the given key.

Syntax

Result = *Obj* `->`[IDLffLanguageCat::]Query(*Key* [, DEFAULT_STRING=*string*])

Return Value

Returns a string representing the language associated with the given key. If the key is not found in the given catalog, the default string is returned.

Arguments

Key

The scalar or array of (string) keys associated with the desired language string. If key is an array, *Result* will be a string array of the associated language strings.

Keywords

DEFAULT_STRING

Set this keyword to the desired value of the return string if the key cannot be found in the catalog file. The default value is the empty string.

Version History

Introduced: 5.2.1

IDLffLanguageCat::SetCatalog

The IDLffLanguageCat::SetCatalog function method is used to set the appropriate catalog file.

Syntax

Result = *Obj* ->[IDLffLanguageCat::]SetCatalog(*Application* [, FILENAME=*string*] [, LOCALE=*string*] [, PATH=*string*])

Return Value

Returns 1 upon success, and 0 on failure

Arguments

Application

A scalar string representing the name of the desired application's catalog file.

Keywords

FILENAME

Set this keyword to a scalar string containing the full path and filename of the catalog file to open. If this keyword is set, *application*, PATH, and LOCALE are ignored.

LOCALE

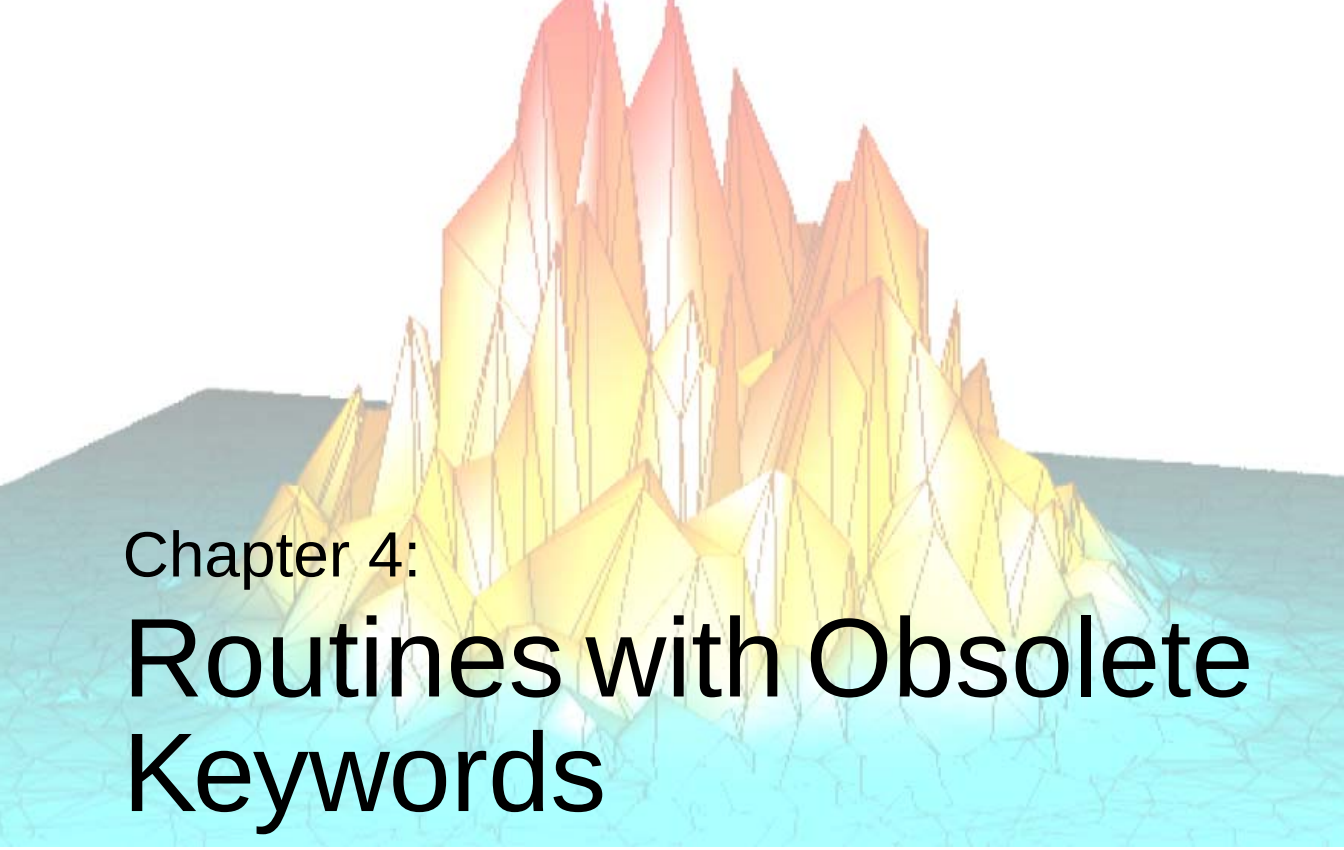
Set this keyword to the desired locale for the catalog file. If not set, the current locale is used.

PATH

Set this keyword to a scalar string containing the path to search for language catalog files. The default is the current directory.

Version History

Introduced: 5.2.1



Chapter 4: Routines with Obsolete Keywords

This chapter contains documentation for keywords that have been removed from IDL routines. New IDL code should not use these keywords. See Appendix I, "Obsolete Features" in the *IDL Reference Guide* manual for a list of obsolete keywords and their replacements, if suitable replacements exist.

When IDL attempts to execute a routine called with an obsolete keyword, one of the following things will happen:

1. The routine may function as originally designed, with no change in behavior. This is often the case when the obsolete keyword has been replaced by another keyword with a more efficient or slightly different mechanism. In these cases, the obsolete keyword is generally re-implemented within the routine to use the mechanism of the new keyword, allowing code that uses the obsolete keyword to run unaltered. Note that although the results will be the same as before the keyword became obsolete, the code may run more efficiently if the replacement keyword is used instead of the obsolete keyword.

Example: The GROUP keyword to the DIALOG_PICKFILE routine was replaced by the DIALOG_PARENT keyword. Code that uses the GROUP keyword continues to run as it always did.

2. The routine may quietly accept the keyword, but ignore its presence. This is the case when the presence of the obsolete keyword does not change the result returned by the routine. For example, keywords that affected attributes only available on certain platforms may simply be ignored on other platforms. Code using obsolete keywords of this type can run unaltered.

   Example: The MACTYPE keyword to the OPEN routine changed an attribute of files on pre-OS X Macintosh filesystems that has no corollary on other filesystems. IDL simply ignores the presence of this keyword.

3. The routine may generate an error. This is the case when the presence of the obsolete keyword changes the result returned by the routine. For example, keywords that affected the returned data in some way that is no longer supported must now be removed from IDL code before it will run.

   Example: The DTOGFLOAT keyword to the BYTEORDER routine converted data to a format only supported under VMS. The underlying mechanism used is not available in other operating systems, and IDL will generate an error if such a conversion is specified in the call to BYTEORDER.

In all cases, if IDL code containing calls to obsolete keywords compiles and runs without error, the results are the same as they would have been before the keyword was made obsolete.

BYTEORDER

The following keywords to the BYTEORDER procedure are obsolete.

VMS-Only Keywords

DTOGFLOAT

Set this keyword to convert native (IEEE) double-precision floating-point format to VAX G float format. Note that IDL does not support the VAX G float format via any other mechanism.

GFLOATTOD

Set this keyword to convert VAX G float format to native (IEEE) double-precision floating-point format. Note that IDL does not support the VAX G float format via any other mechanism.

CALL_EXTERNAL

The following keywords to the CALL_EXTERNAL function are obsolete.

Keywords

DEFAULT

This keyword is ignored on non-VMS platforms. Under VMS, it is a string containing the default device, directory, file name, and file type information for the file that contains the sharable image.

PORTABLE

Under VMS, causes CALL_EXTERNAL to use the IDL Portable calling convention for passing arguments to the called function instead of the default VMS LIB$CALLG convention. Under other operating systems, only the portable convention is available, so this keyword is quietly ignored.

If you are using the IDL Portable calling convention, the AUTO_GLUE or WRITE_WRAPPER keywords are available to simplify the task of matching the form in which IDL passes the arguments to the interface of your target function.

VAX_FLOAT (VMS Only)

If specified, all data passed to the called function is first converted to VAX F (single) or D (double) floating point formats. On return, any data passed by reference is converted back to the IEEE format used by IDL. This feature allows you to call code compiled to work with earlier versions of IDL, which used the old VAX formats.

The default setting for this keyword is FALSE, unless IDL was started with the VAX_FLOAT startup option, in which case the default is TRUE. See “Command Line Options” in Chapter 4 of *Using IDL* for details on this qualifier. You can change this setting at runtime using the VAX_FLOAT function.

DEVICE

The following keywords to the DEVICE procedure are obsolete.

Keywords

DEPTH

(LJ)

The DEPTH keyword specifies the number of significant bits in a pixel. The LJ250 can support between 1 and 4 significant bits (known also as planes). The number of available colors is related to the number of significant planes by the equation:

Colors = $2^{\#planes}$

Therefore, the LJ250 can support 2, 4, 8, or 16 separate colors on a single page of output. The default is to use a single plane, producing monochrome output.

Since IDL is based around 8-bit pixels, it is necessary to define which bits in a 8-bit pixel are used by the LJ250 driver, and which are ignored. When using a depth of 1 (monochrome), dithering techniques are used to render images. In this case, all 8 bits are used. If more than a single plane is used, the least significant n bits of a 8-bit pixel are used, where n is the selected depth. For example, using a depth of 4, pixel values of 15, 31, and 47 are all considered to have the value 15 because all three values have the same binary representation in their 4 least significant digits.

When the depth is changed, the standard color map given in Table 7-5 of the `LJ250/LJ252 Companion Color Printer Programmer Reference Manual` is automatically loaded. Therefore, color maps should be loaded with TVLCT after changing the depth.

FONT

(WIN, X)

This keyword is now obsolete and has been replaced by the SET_FONT keyword. Code that uses the FONT keyword will continue to function as before, but we suggest that all new code use SET_FONT.

DOC_LIBRARY

The following keywords to the DOC_LIBRARY procedure are obsolete.

VMS Keywords

FILE

If this keyword is set, the output is left in the file `userlib.doc`, in the current directory.

PATH

A string that describes an optional directory/library search path. This keyword uses the same format and semantics as !PATH. If omitted, !PATH is used.

OUTPUTS

If this keyword is set, documentation is sent to the standard output unless the PRINT keyword is set.

EXTRACT_SLICE

The following keywords to the EXTRACT_SLICE procedure are obsolete.

CUBIC

Set this keyword to use cubic interpolation. The default is to use tri-linear interpolation. If the SAMPLE keyword is set, then the CUBIC keyword is ignored.

IDLgrMPEG::Save

The following keywords to the IDLgrMPEG::Save procedure method are obsolete.

Keywords

CREATOR_TYPE

Set this keyword to a four character string representing the creator string to be used when writing this file on a Macintosh. This property is ignored if the current platform is not a Macintosh. The default is `TVOD` (Apple Movie Player application).

IDLgrVolume::Init

The following keywords to the IDLgrVolume::Init procedure method are obsolete.

Keywords

CUTTING_PLANES *(Get, Set)*

Set this keyword to a floating-point array with dimensions (4, *n*) specifying the coefficients of *n* cutting planes. The cutting plane coefficients are in the form $\{\{n_x, n_y, n_z, D\}, ...\}$ where $(n_x)X+(n_y)Y+(n_z)Z+ D > 0$, and (X, Y, Z) are the voxel coordinates. To clear the cutting planes, set this property to any scalar value (e.g. CUTTING_PLANES = 0). By default, no cutting planes are defined.

IDLITSYS_CREATETOOL

The following keywords to the IDLITSYS_CREATETOOL function are obsolete.

Keywords

PANEL_LOCATION

Set this keyword to an integer value to control where a user interface panel should be displayed. Possible values are:

0	position the panel above the iTool window
1	position the panel below the iTool window
2	position the panel to the left of the iTool window.
3	position the panel to the right of the iTool window (this is the default).

IDLitVisualization::Add

The following keyword to the IDLitVisualization::Add procedure method is obsolete.

Keywords

GROUP

Set this keyword to indicate that the added object is to be considered part of the group that is rooted at this visualization. By default, the added objects are not considered to be part of the group.

IDLitVisualization::GetCenterRotation

The following keyword to the IDLitVisualization::GetCenterRotation procedure method is obsolete.

Keywords

DATA

Set this keyword to indicate that the ranges should be computed for the full data sets of the contents of this visualization. By default (if the keyword is not set), the ranges are computed for the displayed portions of the data sets.

IDLitVisualization::GetProperty

The following keyword to the IDLitVisualization::GetProperty procedure method is obsolete.

Keywords

GROUP_PARENT (*Get*)

A reference to the IDLitVisualization object that serves as the group parent for this visualization.

IVolume

The following keyword to the IVolume procedure method is obsolete.

Keywords

CUTTING_PLANES *(Get, Set)*

Set this keyword to a floating-point array with dimensions (4, n) specifying the coefficients of n cutting planes. The cutting plane coefficients are in the form $\{\{n_x, n_y, n_z, D\}, ...\}$ where $(n_x)X+(n_y)Y+(n_z)Z+ D > 0$, and (X, Y, Z) are the voxel coordinates. To clear the cutting planes, set this property to any scalar value (e.g. CUTTING_PLANES = 0). By default, no cutting planes are defined.

LINKIMAGE

The following keywords to the LINKIMAGE procedure are obsolete.

Keywords

DEFAULT

This keyword is ignored on non-VMS platforms. Under VMS, it is a string containing the default device, directory, file name, and file type information for the file that contains the sharable image. See "VMS LINKIMAGE and LIB$FIND_IMAGE_SYMBOL" on page 1281 for additional information.

LIVE_PRINT

The following keywords to the LIVE_PRINT procedure are obsolete.

Keywords

SETUP

(Macintosh users only) Set this keyword to have a printer setup dialog appear. This keyword allows the user to setup the page for printing.

MAKE_DLL

The following keywords to the MAKE_DLL procedure are obsolete.

VMS-Only Keywords

This keyword is for VMS platforms only, and is ignored on all other platforms.

VAX_FLOAT

If set, specifies the sharable library to be compiled for VAX F (single) or D (double) floating point formats. The default is to use the IEEE format used by IDL.

ONLINE_HELP

The following keywords to the three ONLINE_HELP procedure are obsolete.

HTML_HELP

Set this keyword to a non-zero value to indicate that the file specified by the BOOK keyword should be viewed with the HTML Help viewer. Explicitly set this keyword equal to zero to indicate that the file should be viewed with the traditional Windows help viewer.

Note

Normally, ONLINE_HELP can properly determine which viewer to use based on the name of the file, so use of the HTML_HELP keyword is rarely necessary.

OPEN

The following keywords to the three OPEN procedures are obsolete.

Macintosh-Only Keywords

MACCREATOR

Use this keyword to specify a four-character scalar string identifying the Macintosh file creator code of the file being created. For example, set

```
MACCREATOR = 'MSWD'
```

to create a file with the creator code `MSWD`. The default creator code is `MIDL`.

MACTYPE

Use this keyword to specify a four-character scalar string identifying the Macintosh file type of the file being created. For example, set

```
MACTYPE = 'PICT'
```

to create a file of type `PICT`. The default file type is `TEXT`.

UNIX-Only Keywords

The previous keyword NOSTDIO is now obsolete. It has been renamed RAWIO to reflect the fact that stdio may or may not actually be used. All references to NOSTDIO should be changed to be RAWIO, but NOSTDIO will still be accepted as a synonym for RAWIO.

NOSTDIO

Set this keyword to disable all use of the standard UNIX I/O for the file, in favor of direct calls to the operating system. This allows direct access to devices, such as tape drives, that are difficult or impossible to use effectively through the standard I/O. Using this keyword has the following implications:

- No formatted or associated (ASSOC) I/O is allowed on the file. Only READU and WRITEU are allowed.
- Normally, attempting to read more data than is available from a file causes the unfilled space to be set to zero and an error to be issued. This does not happen with files opened with NOSTDIO. When using NOSTDIO, the programmer

must check the transfer count, either via the TRANSFER_COUNT keywords to READU and WRITEU, or the FSTAT function.

- The EOF and POINT_LUN functions cannot be used with a file opened with NOSTDIO.
- Each call to READU or WRITEU maps directly to UNIX read(2) and write(2) system calls. The programmer must read the UNIX system documentation for these calls and documentation on the target device to determine if there are any special rules for I/O to that device. For example, the size of data that can be transferred to many cartridge tape drives is often forced to be a multiple of 512 bytes.

VMS-Only Keywords

BLOCK

Set this keyword to process the file using RMS block mode. In this mode, most RMS processing is bypassed and IDL reads and writes to the file in disk block units. Such files can only be accessed via unformatted I/O commands. Block mode files are treated as an uninterpreted stream of bytes in a manner similar to UNIX stream files.

For best performance, by default IDL uses RMS block mode for fixed length record files. However, when the SHARED keyword is present, IDL uses standard RMS mode. Do not specify both BLOCK and SHARED.

This keyword is ignored when used with stream files.

Note

With some controller/disk combinations, RMS does not allow transfer of an odd number of bytes.

DEFAULT

A scalar string that provides a default file specification from which missing parts of the File argument are taken. For example, to make .LOG be the default file extension when opening a new file, use the command:

```
OPENW, 'DATA', DEFAULT='.LOG'
```

This statement will open the file DATA.LOG.

EXTENDSIZE

File extension is a relatively slow operation, and it is desirable to minimize the number of times it is done. In order to avoid the unacceptable performance that would result from extending a file a single block at a time, VMS extends its size by a default number of blocks in an attempt to trade a small amount of wasted disk space for better performance. The EXTENDSIZE keyword overrides the default, and specifies the number of disk blocks by which the file should be extended. This keyword is often used in conjunction with the INITIALSIZE and TRUNCATE_ON_CLOSE keywords.

FIXED

Set this keyword to indicate that the file has fixed-length records. The *Record_Length* argument is required when opening new, fixed-length files.

FORTRAN

Set this keyword to use FORTRAN-style carriage control when creating a new file. The first byte of each record controls the formatting.

INITIALSIZE

The initial size of the file allocation in blocks. This keyword is often used in conjunction with the EXTENDSIZE and TRUNCATE_ON_CLOSE keywords.

KEYED

Set this keyword to indicate that the file has indexed organization. Indexed files are discussed in "VMS-Specific Information" in Chapter 8 of *Building IDL Applications*.

LIST

Set this keyword to specify carriage-return carriage control when creating a new file. If no carriage-control keyword is specified, LIST is the default.

NONE

Set this keyword to specify explicit carriage control when creating a new file. When using explicit carriage control, VMS does not add any carriage control information to the file, and the user must explicitly add any desired carriage control to the data being written to the file.

PRINT

Set this keyword to send the file to SYS$PRINT, the default system printer, when it is closed.

SEGMENTED

Set this keyword to indicate that the file has VMS FORTRAN-style segmented records. Segmented records are a method by which FORTRAN allows logical records to exist with record sizes that exceed the maximum possible physical record sizes supported by VMS. Segmented record files are useful primarily for passing data between FORTRAN and IDL programs.

SHARED

Set this keyword to allow other processes read and write access to the file in parallel with IDL. If SHARED is not set, read-only files are opened for read sharing and read/write files are not shared. The SHARED keyword cannot be used with STREAM files.

Warning

It is not a good idea to allow shared write access to files open in RMS block mode. In block mode, VMS cannot perform the usual record locking that prevents file corruption. It is therefore possible for multiple writers to corrupt a block mode file. This warning also applies to fixed-length record disk files, which are also processed in block mode. When using SHARED, do not specify either BLOCK or UDF_BLOCK.

STREAM

Set this keyword to open the file in stream mode using the Standard C Library (stdio).

SUBMIT

Set this keyword to submit the file to SYS$BATCH, the default system batch queue, when it is closed.

SUPERSEDE

Set this keyword to allow an existing file to be superseded by a new file of the same name, type, and version.

TRUNCATE_ON_CLOSE

Set this keyword to free any unused disk space allocated to the file when the file is closed. This keyword can be used to get rid of excess allocations caused by the EXTENDSIZE and INITIALSIZE keywords. If the SHARED keyword is set, or the file is open for read-only access, TRUNCATE_ON_CLOSE has no effect.

UDF_BLOCK

Set this keyword to create a file similar to those created with the BLOCK keyword except that new files are created with the RMS undefined record type. Files created in this way can only be accessed by IDL in block mode, and cannot be processed by many VMS utilities. Do not specify both UDF_BLOCK and SHARED.

VARIABLE

Set this keyword to indicate that the file has variable-length records. If the *Record_Length* argument is present, it specifies the maximum record size. Otherwise, the only limit is that imposed by RMS (32767 bytes). If no file organization is specified, variable-length records are the default.

Warning

VMS variable length records have a 2-byte record-length descriptor at the beginning of each record. Because the FSTAT function returns the length of the data file *including* the record descriptors, reading a file with VMS variable length records into a byte array of the size returned by FSTAT will result in an RMS EOF error.

Windows-Only Keywords

The Windows-Only keywords BINARY and NOAUTOMODE are now obsolete. Input/Output on Windows is now handled indentically to Unix, and does not require you to be concerned about the difference between “text” and “binary” modes. These keywords are still accepted for backwards compatibility, but are ignored.

BINARY

Set this keyword to treat opened files as binary files. When writing text to a binary file, CR/LF pairs are written as LF only. Note that setting the BINARY keyword alone does not ensure that a routine that writes to the file will not change the mode to text.

NOAUTOMODE

Set this keyword to prevent IDL routines such as PRINTF from automatically changing the mode from binary to text, or vice versa.

PRINT/PRINTF

The following keywords to the two PRINT procedures are obsolete.

VMS Keywords

REWRITE

When writing data to a file with indexed organization, set the REWRITE keyword to specify that the data should update the contents of the most recently input record instead of creating a new record.

READ_TIFF

The following keywords to the READ_TIFF function are obsolete.

Keywords

ORDER

Set this keyword to a named variable that will contain the order value from the TIFF file. This value is returned as 0 for images written bottom to top, and 1 for images written top to bottom. If an order value does not appear in the TIFF file, an order of 1 is returned.

The ORDER keyword can return any of the following additional values (depending on the source of the TIFF file):

Rows	Columns
1	top to bottom, left to right
2	top to bottom, right to left
3	bottom to top, right to left
4	bottom to top, left to right
5	top to bottom, left to right
6	top to bottom, right to left
7	bottom to top, right to left
8	bottom to top, left to right

Table 1: Values for the ORDER keyword

Reference: Aldus TIFF 6.0 spec (TIFF version 42).

UNSIGNED

This keyword is now obsolete because older versions of IDL did not support the unsigned 16-bit integer data type. Set this keyword to return TIFF files containing unsigned 16-bit integers as signed 32-bit longword arrays. If not set, return an unsigned 16-bit integer for these files. This keyword has no effect if the input file does not contain 16-bit integers.

READ/READF

The following keywords to the READ procedures are obsolete.

VMS Keywords

Note also that the obsolete VMS-only routine READ_KEY has been replaced by the keywords below.

KEY_ID

The index key to be used (primary = 0, first alternate key = 1, etc...) when accessing data from a file with indexed organization. If this keyword is omitted, the primary key is used.

KEY_MATCH

The relation to be used when matching the supplied key with key field values (EQ = 0, GE = 1, GT = 2) when accessing data from a file with indexed organization. If this keyword is omitted, the equality relation (0) is used.

KEY_VALUE

The value of a key to be found when accessing data from a file with indexed organization. This value must match the key definition that is determined when the file was created in terms of type and size—no conversions are performed. If this keyword is omitted, the next sequential record is used.

READU

The following keywords to the READU procedure are obsolete.

VMS-Only Keywords

Note

The obsolete VMS routines FORRD, and FORRD_KEY have been replaced by the READU command used with the following keywords.

KEY_ID

The index key to be used (primary = 0, first alternate key = 1, etc...) when accessing data from a file with indexed organization. If this keyword is omitted, the primary key is used.

KEY_MATCH

The relation to be used when matching the supplied key with key field values (EQ = 0, GE = 1, GT = 2) when accessing data from a file with indexed organization. If this keyword is omitted, the equality relation (0) is used.

KEY_VALUE

The value of a key to be found when accessing data from a file with indexed organization. This value must match the key definition that is determined when the file was created in terms of type and size—no conversions are performed. If this keyword is omitted, the previous key value is used.

SAVE

The following keywords to the SAVE procedure are obsolete.

Keywords

XDR

This keyword is obsolete and will be quietly ignored (there is no need to remove uses of the XDR keyword from existing code). IDL always generates XDR format files, although it will continue to read VAX format SAVE files generated by old versions of VMS IDL.

SPAWN

The following keywords to the SPAWN procedure are obsolete.

Keywords

FORCE

Set this keyword to override buffered file output in IDL and force the file to be closed no matter what errors occur in the process. If it is not possible to properly flush this data when a file close is requested, an error is normally issued and the file remains open. An example of this might be that your disk does not have room to write the remaining data. This default behavior prevents data from being lost, but the FORCE keyword overrides this behavior.

Macintosh-Only Keywords

MACCREATOR

Use this keyword to specify a four-character scalar string containing the Macintosh file creator code of the application to be used to open the specified files. In no files were specified, the application is launched without any files.

VMS-Only Keywords

NOCLISYM

If this keyword is set, the spawned subprocess does not inherit command language interpreter symbols from its parent process. You can specify this keyword to prevent commands redefined by symbol assignments from affecting the spawned commands, or to speed process startup.

NOLOGNAM

If this keyword is set, the spawned subprocess does not inherit process logical names from its parent process. You can specify this keyword to prevent commands redefined by logical name assignments from affecting the spawned commands, or to speed process startup.

NOTIFY

If this keyword is set, a message is broadcast to SYS$OUTPUT when the child process completes or aborts. NOTIFY has no effect unless NOWAIT is set.

WIDGET_BASE

The following keywords to the WIDGET_BASE function are obsolete.

Keywords

APP_MBAR

Set this keyword to a named variable that defines a widget application's menubar. On the Macintosh, the menubar defined by APP_MBAR becomes the system menubar (the menubar at the top of the Macintosh screen). On Motif platforms and under Microsoft Windows, the APP_MBAR is treated in exactly the same fashion as the menubar created with the MBAR keyword. See "MBAR" on page 2115 for details on creating menubars.

Warning

You cannot specify both an APP_MBAR and an MBAR for the same top-level base widget. Doing so will cause an error.

To apply actions triggered by menu items to widgets other than the base that includes the menubar, use the KBRD_FOCUS_EVENTS keyword to keep track of which widget has (or last had) the keyboard focus.

WRITE_TIFF

The following features of the WRITE_TIFF procedure are obsolete.

Arguments

ORDER

This argument should be 0 if the image is stored from bottom to top (the default). For images stored from top to bottom, this argument should be 1.

Warning

Not all TIFF readers honor the value of the Order argument. IDL writes the value into the file, but many known readers ignore this value. In such cases, we recommend that you convert the image to top to bottom order with the REVERSE function and then set Order to 1.

WRITEU

The following keywords to the WRITEU procedure are obsolete.

VMS-Only Keywords

Note

The obsolete FORWRT routine has been replaced by WRITEU.

REWRITE

When writing data to a file with indexed organization, setting the REWRITE keyword specifies that the data should update the contents of the most recently input record instead of creating a new record.

XMANAGER

The following keywords to the XMANAGER procedure are obsolete.

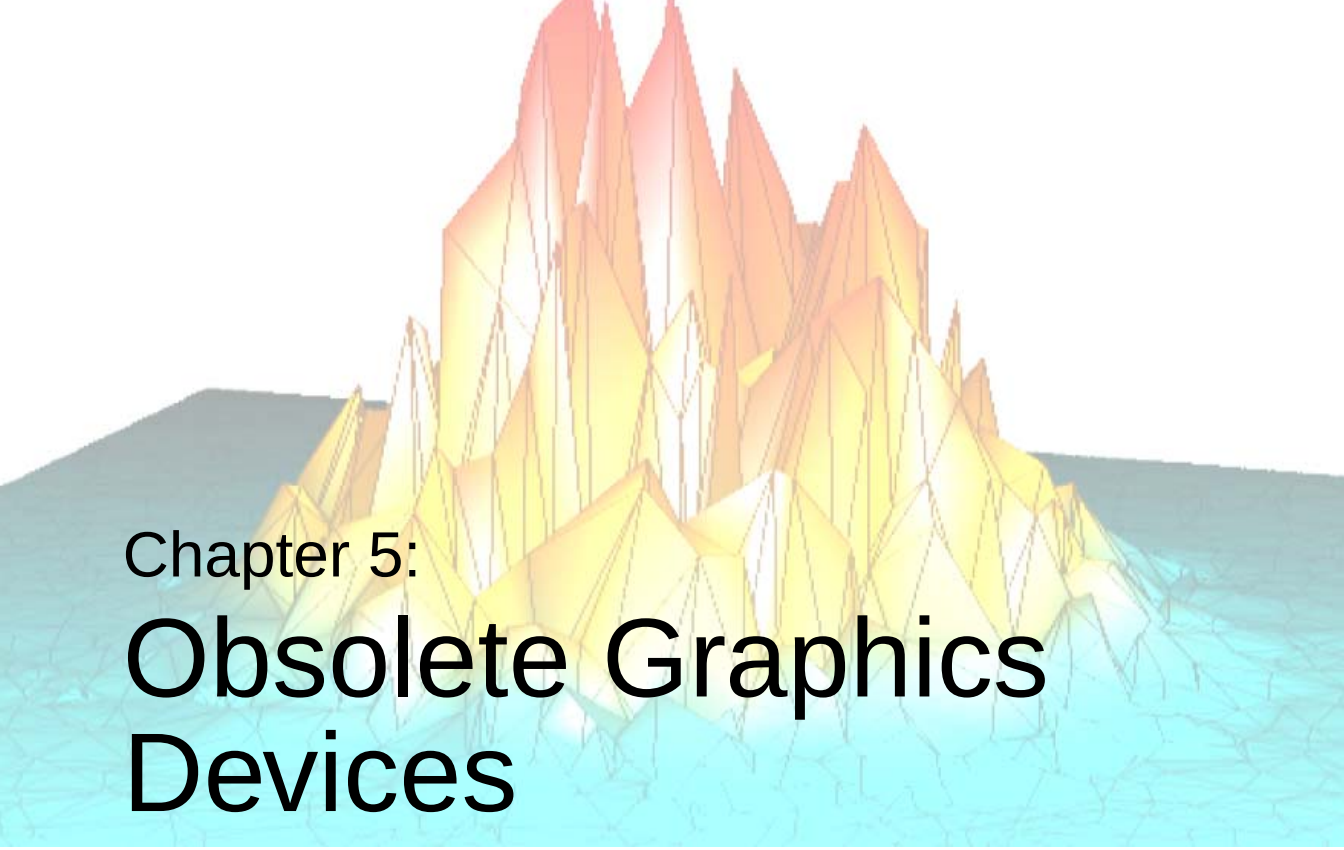
BACKGROUND

This keyword is obsolete and is included in XMANAGER for compatibility with existing code only. Its functionality has been replaced by the TIMER keyword to the WIDGET_CONTROL procedure.

MODAL

This keyword is obsolete and is included in XMANAGER for compatibility with existing code only. Its functionality has been replaced by the MODAL keyword to the WIDGET_BASE procedure.

When this keyword is set, the widget that is being registered traps all events and desensitizes all the other widgets. It is useful when input from the user is necessary to continue (i.e., “blocking” dialog boxes). Once the modal widget dies, the others are resensitized and the normal event processing continues.



Chapter 5: Obsolete Graphics Devices

This chapter contains documentation for graphics devices that are no longer supported by IDL. If you attempt to set IDL's graphics device to be one of the devices listed in this chapter via the SET_PLOT procedure, IDL will generate an error like

```
% Graphics device not available: device
```

For information on keywords to the DEVICE procedure that have become obsolete along with these graphics devices, see the DEVICE section of Chapter 4, "Routines with Obsolete Keywords".

The LJ Device

Device Keywords Accepted by the LJ Device:

CLOSE_FILE, DEPTH, FILENAME, FLOYD, INCHES, LANDSCAPE, ORDERED, PIXELS, PORTRAIT, RESOLUTION, SET_CHARACTER_SIZE, THRESHOLD, XOFFSET, XSIZE, YOFFSET, YSIZE.

The LJ250 and LJ252 are color printers sold by Digital Equipment Corporation (DEC). To direct graphics output to a picture description file compatible with these printers, issue the command:

```
SET_PLOT, 'LJ'
```

This causes IDL to use the LJ driver for producing graphical output. To actually print the generated graphics, send the file to the printer using the normal printing facilities supplied by the operating system. Once the LJ driver is enabled via SET_PLOT, the DEVICE procedure is used to control its actions, as described below. The default settings for the LJ driver are given in the following table. Use the `HELP, /DEVICE` command to view the current font, file, and other options currently set for LJ output.

Feature	Value
File	idl.lj
Mode	Portrait
Dither method	Floyd-Steinberg
Resolution	180 dpi
Number of planes	1 (monochrome)
Horizontal offset	1/2 in.
Vertical offset	1 in.
Width	7 in.
Height	5 in.

Table 0-1: Default LJ Driver Settings

LJ Driver Strengths

The LJ250 produces color graphics at a low cost. It is capable of producing good quality monochrome output, and is also good at color vector graphics and simple color imaging using a small number of predefined solid colors.

LJ Driver Limitations

The LJ250 is intended to be used as a low cost printer for business color graphics. Although it can be used to print color images, it is limited in its ability to produce satisfactory images of the sort commonly encountered in science and engineering. These limitations make it a poor choice for such work.

- Although color is specified via the usual RGB triples using the TVLCT procedure, the LJ250 is only capable of generating a fixed set of colors. The number of possible colors depends on the resolution in use. When producing 180 dpi graphics, only the colors given in the following table are possible. In 90 dpi mode, 256 colors are available.

Color	Red Value	Green Value	Blue Value
Black	10	10	10
Yellow	227	212	33
Magenta	135	13	64
Cyan	5	56	163
Red	135	20	36
Green	8	66	56
Blue	10	10	74
White	229	224	217

Table 0-2: LJ250 Colors Available at 180 dpi

If a color is specified that the printer cannot produce, it substitutes the closest color it can. However, the results of such substitutions can give unexpected results. The fixed set of possible colors means that the LOADCT procedure is of limited use with the LJ250. It also means that it is difficult to produce satisfactory grayscale images.

- The number of simultaneous colors possible on an output page is limited. Although images are specified in 8-bit bytes, the number of significant bits used ranges from 1 to 4 (as specified via the DEPTH keyword to the DEVICE procedure), allowing from 2 to 16 colors. Coupled with the above limitation on the colors that are possible, it is difficult to produce high quality image output.

LJ Suggestions

The following suggestions are intended to help you get the most out of the LJ250, taking its limitations into account:

- Use monochrome output when possible. This results in considerably smaller output files, and provides most of the abilities the LJ250 handles well. When producing monochrome output, the LJ250 driver dithers images. This can often produce more satisfying grayscale output than is possible using the printer in color mode.
- The table under "LJ Driver Limitations" above gives the RGB values to use when specifying colors at 180 dpi. To make more colors available, use 90 dpi resolution. The RGB values for the possible colors at 90 dpi are given in Table 7-6 of the *`LJ250/LJ252 Companion Color Printer Programmer Reference Manual`*. You can cause the printer to display the complete 256 color palette as follows: With the power off, press and hold the READY and DEC/PCL switches while momentarily pressing the power switch. Wait approximately 2 seconds and release the READY and DEC/PCL switches. The printer will take a few minutes to print all 256 colors. The output fits on a single page.

  Use the table in the programmers manual with this display to select the colors to use. Note that the RGB values in the programmers manual are scaled from 1 to 100, while IDL scales such values from 0 to 255. Therefore, multiply the values obtained from the manual by 2.55 to properly scale them for use in IDL.
- Unlike most devices, IDL does not initialize the LJ250 color map to a grayscale ramp because the printer cannot produce a satisfactory grayscale image. Instead, the default palettes given in Table 7-5 of the *`LJ250/LJ252 Companion Color Printer Programmer Reference Manual`* are used. If you modify the color map, the LJLCT procedure can be used to reset the color table to these defaults. LJLCT examines the !D.N_COLORS system variable to determine the number of output planes in use, then loads the appropriate default color map.
- When producing images, stick to images with small amounts of detail and large sections of uniform color. Complicated images do not reproduce well on this printer.

The Macintosh Device

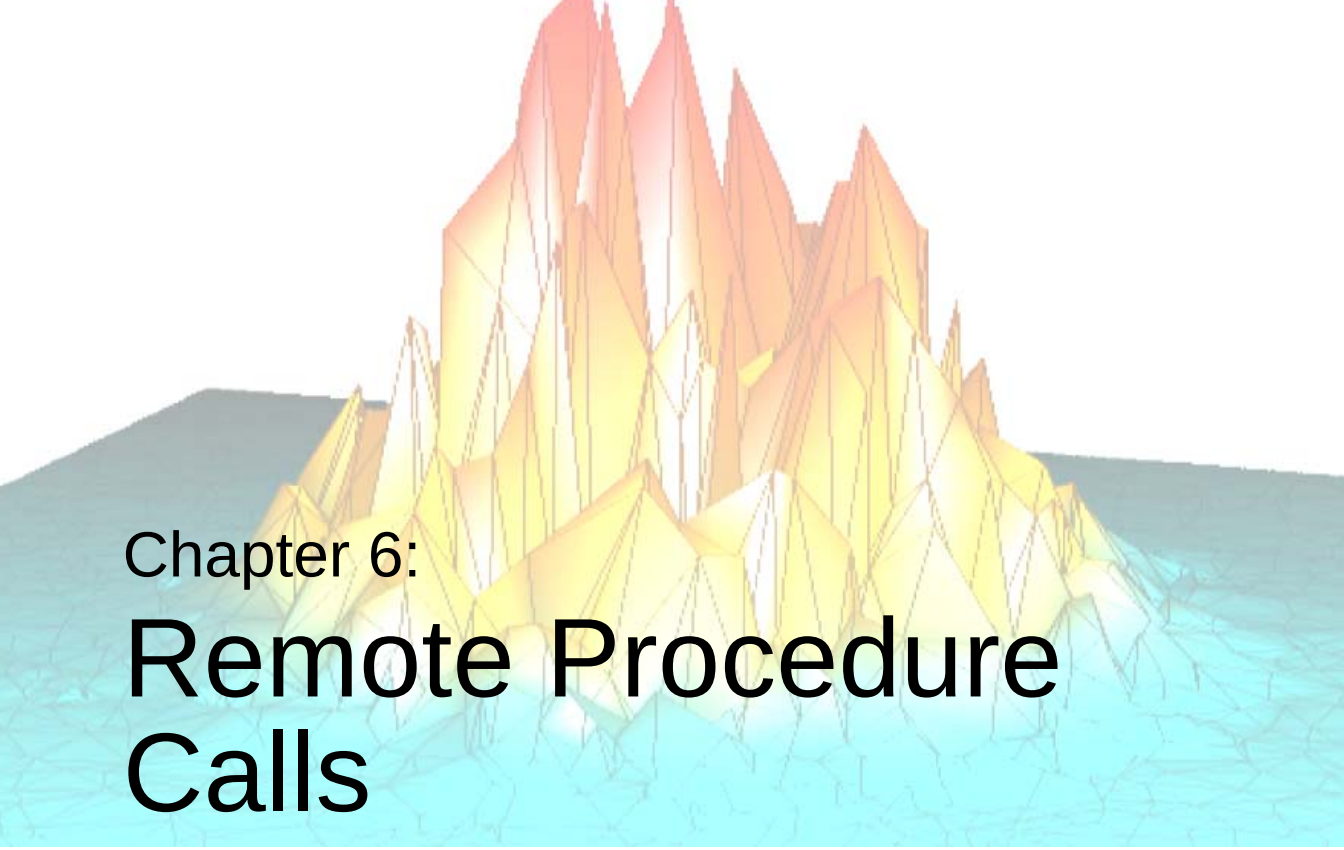
Device Keywords Accepted by the MAC Device:

BYPASS_TRANSLATION, COPY, CURSOR_ORIGINAL, CURSOR_STANDARD, DECOMPOSED, FLOYD, GET_CURRENT_FONT, GET_FONTNAMES, GET_FONTNUM, GET_GRAPHICS_FUNCTION, GET_SCREEN_SIZE, GET_WINDOW_POSITION, ORDERED, PSEUDO_COLOR, RETAIN, SET_CHARACTER_SIZE, SET_FONT, SET_GRAPHICS_FUNCTION, THRESHOLD, TRANSLATION, TRUE_COLOR

The Macintosh version of IDL uses the “MAC” device by default. This device is similar to The X Windows Device. The “MAC” device is only available in IDL for Macintosh.

To set plotting to the Macintosh device, use the command:

```
SET_PLOT, 'MAC'
```



Chapter 6:

Remote Procedure Calls

Note

Remote Procedure Calls are still included in IDL. The RPC API described here (the API included with IDL version 4.0) has been replaced with a new API. See the External Development Guide for details on the RPC API included with IDL version 5.0 and later.

Remote Procedure Calls (RPCs) allow one process (the *client* process) to have another process (the *server* process) execute a procedure call just as if the caller process had executed the procedure call in its own address space. Since the client and server are separate processes, they can reside on the same machine or on different machines. RPC libraries allow the creation of network applications without having to worry about underlying networking mechanisms.

IDL supports RPCs so that other applications can communicate with IDL. A library of C language routines is included to handle communication between client programs and the IDL server. `Note that remote procedure calls are supported only on UNIX platforms.`

The current implementation allows IDL to be run as an RPC server and your own program to be run as a client. IDL commands can be sent from your application to the IDL server, where they are executed. Variable structures can be defined in the client program and then sent to the IDL server for creation as IDL variables. Similarly, the values of variables in the IDL server session can be retrieved into the client process.

Using IDL as an RPC Server

The IDL RPC Directory

All of the files related to using IDL's RPC capabilities are found in the `rpc` subdirectory of the `external` subdirectory of the main IDL directory. The main IDL directory is referred to here as *idldir*.

Running IDL in Server Mode

To use IDL as an RPC server, run IDL in server mode by using the `-server` command line option. This option can be invoked one of two ways:

```
idl -server process_id
```

or

```
idl -server=server_number process_id
```

where *server_number* is the hexadecimal server ID number (between 0x20000000 and 0x3FFFFFFF) for IDL to use. For example, to run IDL with the server ID number 0x20500000, use the command:

```
idl -server=20500000
```

If a server ID number is not supplied, IDL uses the default, IDL_DEFAULT_ID, defined in the file *idldir*`/external/rpc/rpc_idl.h`. This value is originally set to 0x2010CAFE.

The *`process_id`* argument is an optional argument that specifies the process ID of a UNIX process that should be contacted when IDL has finished running in interactive mode. If the IDL rpc server is placed in interactive mode and a process ID has been supplied on the command line, IDL sends the UNIX signal SIGUSR1 to the specified process. This signal allows the client program to know when it can continue to communicate with the rpc server.

Creating the IDL RPC Library

The machine that runs the client program must have its own version of the IDL RPC library. The make file for this library is contained in the directory *idldir*`/external/rpc`. If the machine that runs the client program is not licensed to run IDL, simply copy the contents of the IDL `rpc` directory to an appropriate location on the client machine.

To build the IDL RPC library, copy the IDL `rpc` directory to a new directory, change to that directory, and enter the make command:

```
cp -R idldir/external/rpc newrpcdir
cd newrpcdir
make
```

The created library is contained in the file *newrpcdir*`/rpcidl.a`. The functions contained in the library are described in "The IDL RPC Library" on page 237

Linking your Client Program

Your client program must include the file *idldir*`/external/rpc/rpc_idl.h`.

You must also link the application that communicates with IDL with the IDL RPC library. For example, to compile and link a program with the IDL RPC library, you might enter:

```
cc -c rpcclient.c
cc -o rpcclient.o idldir/external/rpc/rpcidl.a
```

where *rpcclient.c* is the name of your program. Note that your actual command lines and flag settings may be different than the ones shown above, depending upon your C compiler. The `Makefile` contains details on modifications for various systems.

The IDL RPC Library

The IDL RPC library contains several C language interface functions that facilitate communication between your application and IDL. There are functions to register and unregister clients, set timeouts, get and set the value of IDL variables, send commands to the IDL server, and cause the server to exit. These functions are described below.

free_idl_variable

Syntax

```
void free_idl_var(varinfo_t* var);
```

Description

This function frees all dynamic memory associated with the given variable. Attempts to free a static variable are silently ignored. (See "Notes on Variable Creation and Memory Management" on page 262)

Parameters

var

The address of the varinfo_t structure that contains the information about the variable to be freed.

Return Value

None

get_idl_variable

Syntax

```
int get_idl_variable(CLIENT* client, char* name, varinfo_t* var,
     int typecode)
```

Description

Call this function to retrieve the value of an IDL variable in the IDL session referred to by client. Any scalar or array variable type can be retrieved. Variables can be retrieved only from the main program level.

Note that it is not possible to get the value of an IDL structure. To retrieve values from an IDL structure, “decompose” the structure into regular variables in IDL, then use this function to get the values of those individual variables.

It is not possible to get the value of IDL system variables directly. To retrieve the value of an IDL system variable, first copy it to a regular IDL variable. The value of the regular variable can then be retrieved with get_idl_variable. For example:

```
varinfo_t pt;/* Declare variable pt */
send_idl_command(client, "X = !P.T");
get_idl_variable(client, "X", &pt, 0);
```

Parameters

client

A pointer to the CLIENT structure that corresponds to the desired IDL session.

name

A null terminated string that contains the name of the IDL variable to be retrieved. Only the first `MAXIDLEN` characters of this string are used. `MAXIDLEN` is defined in the file *idldir*`/external/rpc/rpc_idl.h`.

var

The address of a `varinfo_t` structure in which to store the returned variable information. Upon return, the `Name` field of the `var` structure contains the name of the variable as found in IDL. If the name supplied is an illegal IDL variable name, the `Name` field is set to `<ILLEGAL_NAME>`. If the variable is a structure or associated variable, the `Name` field is set to `<BAD-VAR-TYPE>`.

typecode

If you want IDL to typecast a variable (i.e., guarantee the value to be of a particular type) before it is transported, set `typecode` to one of the following values (defined in the file `export.h`):

```
IDL_TYP_BYTE, IDL_TYP_INT, IDL_TYP_LONG, IDL_TYP_FLOAT,
IDL_TYP_DOUBLE, IDL_TYP_STRING, IDL_TYP_COMPLEX, IDL_TYP_DCOMPLEX
```

For example, the command:

```
get_idl_variable(client, "x", &xv, IDL_TYP_LONG)
```

guarantees that the value in `x` is returned as a 32-bit integer.

If `typecode` is 0, the variable is transferred with whatever data type it has in the server. Typecasting only affects the variables in the client – the server side is not affected.

Return Value

This function returns a status value that denotes the success or failure of this function as described below.

-1	Failure: bad arguments supplied (e.g., name or var is NULL).
0	RPC mechanism failed (an error message may also be printed).
1	Success
-2	Illegal variable name (e.g., “213xyz”, “#a”, “!DEVICE”)
-3	Variable not transportable (e.g., the variable is a structure or associated variable)

idl_server_interactive

Syntax

```
int idl_server_interactive(CLIENT*client)
```

Description

Call this function to cause the IDL server to become an interactive IDL session. It is likely that this command will time out. Some alternative mechanism for determining when the server is finished should be implemented. See the example `server.c` in the *idldir*/`examples/rpc` directory.

Parameters

client

A CLIENT structure that corresponds to the desired IDL session.

Return Value

This function returns TRUE if the interactive IDL session did not time out. FALSE is returned if the session times out or otherwise fails.

kill_server

Syntax

```
int kill_server(CLIENT*client)
```

Description

Call this function to kill the IDL RPC server.

Parameters

client

The pointer to a CLIENT structure registered with the server to be killed.

Return Value

This function returns TRUE if the server was successfully killed. FALSE is returned otherwise.

register_idl_client

Syntax

```
CLIENT* register_idl_client(long server_id, char* hostname,
     struct timeval* timeout)
```

Description

Call this function to register your program as a client of an IDL server. Note that a program can be the client of a number of different servers at the same time and a single server can have multiple clients.

Parameters

server_id

The ID number of the IDL server that the program is to be registered with. If this value is 0, the default server ID (0x2010CAFE) is used.

hostname

The name of the machine where the IDL server is running. If this value is NULL or `""`, the default, `localhost`, is used.

timeout

A pointer to the timeout value for all communication with IDL servers. If this value is NULL or 0, the default timeout, 60 seconds, is used.

Return Value

A pointer to the new CLIENT structure is returned. This function returns NULL if it is unsuccessful.

send_idl_command

Syntax

```
int send_idl_command(CLIENT* client, char* command);
```

Description

Call this function to send an IDL command to the IDL server referred to by client. The command is executed just as if it had been entered from the IDL command line.

This function cannot be used to send multi-line commands. If the first part of a multi-line command is sent, for example:

```
send_idl_command(client, "FOR I=1,5 DO $");
```

IDL spawns an interactive session and may hang. In any case, subsequent commands are not executed.

Parameters

client

A pointer to the CLIENT structure that corresponds to the desired IDL session.

command

A null-terminated string with no more than `MAX_STRING_LEN` characters. `MAX_STRING_LEN` is defined in the file *idldir*`/external/rpc/rpc_idl.h`.

Return Value

This function returns a status value that denotes success or failure as described below.

- -1 = RPC communication failure (an error message is also printed).
- 0 = Command is NULL.
- 1 = Success.

For all other errors, the error number is returned. This number could be passed as an argument to `STRMESSAGE();`.

set_idl_timeout

Syntax

```
int set_idl_timeout(struct timeval* timeout)
```

Description

Call this function to replace the current timeout used by the RPC mechanism with the given timeout.

Parameters

timeout

A pointer to the new timeout value to be used. This parameter has no default.

Return Value

This function returns TRUE if the timeout was replaced. FALSE is returned if the timeout value was NULL or zero.

set_idl_variable

Syntax

```
int set_idl_variable(CLIENT* client, varinfo_t* var);
```

Description

Call this function to assign a value to an IDL variable in the IDL session referred to by `client`. The address `var` points to a `varinfo_t` structure that contains information about the variable to be set. The "helper" functions can be used to build `var`. (See "The varinfo_t Structure" on page 250) Any scalar or array variable type can be set. Variables can be set only in the main IDL program level.

Note that it is not possible to set the value of an IDL structure. To set values in an IDL structure, set the individual elements of the structure to scalar IDL variables, then use the `send_idl_command` function to create the structure in IDL.

It is not possible to set the value of IDL system variables directly. To set the value of an IDL system variable, first set the value of a regular IDL variable. The value of the regular variable can then be assigned to the system variable. For example:

```
set_idl_variable(client, &newvar); /* newvar describes the */
                                   /* IDL variable "NEW" */
send_idl_command(client, "!P.T = NEW");
```

Parameters

client

A pointer to the CLIENT structure that corresponds to the desired IDL session.

var

The address of the `varinfo_t` structure that contains information about the variable to be set.

Return Value

This function returns a status value that denotes the success or failure of this function as described below.

- -1 = Failure: bad arguments supplied (e.g., var is NULL).

- 0 = RPC mechanism failed (an error message is also printed).
- 1 = Success

set_rpc_verbosity

Syntax

```
void set_rpc_verbosity(verbosity)
```

Description

This function controls the printing of error messages by RPC library routines. If verbosity is TRUE, error messages will be printed by the various RPC routines to explain what failed. If verbosity is FALSE, return codes continue to indicate success or failure, but no error messages are printed.

Parameters

verbosity

An `int` specifying TRUE or FALSE as explained above.

Return Value

None

unregister_idl_client

Syntax

```
void unregister_idl_client(CLIENT* client)
```

Description

Call this function to release the resources associated with the given CLIENT structure. The operating system automatically releases the resources associated with all CLIENT structures when your program exits. This function does not affect the IDL server.

Parameters

client

The pointer to the CLIENT structure to be unregistered.

Return Value

None

The varinfo_t Structure

The `varinfo_t` structure is used to pass variables to and from the IDL server.

The `varinfo_t` structure is defined in the *idldir*`/external/rpc/rpc_idl.h` file. The structure is:

```
typedef struct _VARINFO {
char Name[MAXIDLEN+1];
IDL_VPTR Variable;
IDL_LONG Length;
} varinfo_t;
```

Variable Creation Functions

A number of functions are provided to help build `varinfo_t` structures. These functions are contained in the file *idldir*`/external/rpc/helper.c`.

The variable creation functions are described below. Unless otherwise noted, all of the following functions return TRUE if variable creation is successful and FALSE otherwise. When passing a `varinfo_t` structure pointer, if the `Variable` field is NULL, the variable creation functions attempt to allocate that field.

v_make_byte

Syntax

```
int v_make_byte(varinfo_t* var_struct, char* var_name,
     unsigned value)
```

Description

Create an IDL byte variable with the given name and value.

v_make_complex

Syntax

```
int v_make_complex(varinfo_t* var_struct, char* var_name,
     double real_value, double imag_value)
```

Description

Create an IDL complex variable.

v_make_dcomplex

Syntax

```
int v_make_dcomplex(varinfo_t* var_struct, char* var_name,
     double real_value, double imag_value)
```

Description

Create an IDL double-precision complex variable.

v_make_double

Syntax

```
int v_make_double(varinfo_t* var_struct, char* var_name,
     double value)
```

Description

Create an IDL double-precision, floating-point variable.

v_make_float

Syntax

```
int v_make_float(varinfo_t* var_struct, char* var_name,
     double value)
```

Description

Create an IDL single-precision, floating-point variable.

v_make_int

Syntax

```
int v_make_int(varinfo_t* var_struct, char* var_name, int value)
```

Description

Create an IDL (16-bit) integer variable.

v_make_long

Syntax

```
int v_make_long(varinfo_t* var_struct, char* var_name,
     IDL_LONG value)
```

Description

Create an IDL long variable.

v_make_string

Syntax

```
int v_make_string(varinfo_t* var_struct, char* name,
     char* value)
```

Description

Create an IDL string variable.

v_fill_array

Syntax

```
int v_fill_array(varinfo_t* var, char* name, int type,
     int ndimension, IDL_LONG dims[], UCHAR* value,
     IDL_long length)
```

Description

Create an IDL array variable. The *type* argument should be one of the following values (defined in the file `export.h`):

```
IDL_TYP_BYTE, IDL_TYP_INT, IDL_TYP_LONG, IDL_TYP_FLOAT,
IDL_TYP_DOUBLE, IDL_TYP_STRING, IDL_TYP_COMPLEX, IDL_TYP_DCOMPLEX
```

This function allocates `var->Variable->value.arr`.

If `value` is NULL then `var->Variable->value.arr->data` is allocated.

The `dims[]` argument should have at least `ndimension` valid elements.

If `value` is supplied but `length` is 0, var->Length is filled with the computed size of the array (in bytes) and `value` is assumed to point to at least that many bytes of memory. If `value` and `length` are supplied, `length` is assumed to be the size (in bytes) of the region of memory that value points to. (See "Notes on Variable Creation and Memory Management" on page 262)

More Variable Manipulation Macros

The following macros can be used to get information from `varinfo_t` structures. Like the variable creation functions, these macros are defined in the file `rpc_idl.h`.

All of these macros accept a single argument *v* of `varinfo_t` type.

GetArrayData(*v*)

This macro returns a pointer to the array data described by the `varinfo_t` structure.

GetArrayDimensions(*v*)

This macro returns the dimensions of the array described by the `varinfo_t` structure. The dimensions are returned as `long dimensions[]`.

GetArrayNumDims(*v*)

This macro returns the number of dimensions of the array.

GetVarByte(*v*)

This macro returns the value of a 1-byte, unsigned `char variable`.

GetVarComplex(*v*)

This macro returns the value (as a *struct*, not a pointer) of a complex variable.

GetVarDComplex(*v*)

This macro returns the value (as a *struct*, not a pointer) of a double-precision, complex variable.

GetVarDouble(*v*)

This macro returns the value of a double-precision, floating-point variable.

GetVarFloat(*v*)

This macro returns the value of a single-precision, floating point variable.

GetVarInt(*v*)

This macro returns the value of a 2-byte integer variable.

GetVarLong(*v*)

This macro returns the value of a 4-byte integer variable.

GetVarString(*v*)

This macro returns the value of a string variable (as a *char**).

GetVarType(*v*)

This macro returns the type of the variable described by the `varinfo_t` structure. The type is returned as `IDL_TYP_XXX` as described under the documentation for the `get_idl_variable` function.

VarIsArray(*v*)

This macro returns non-zero if *v* is an array variable.

Notes on Variable Creation and Memory Management

This section contains miscellaneous notes about variable creation.

Freeing Resources

The variable creation functions (i.e., `v_make_xxx`) *do not* free resources associated with a variable before placing new information there. Your programs should free resources (if there are any) associated with the `varinfo_t` structure being passed.

To prevent memory leakage, memory associated with a variable is freed before new memory is allocated. You should make sure that the `varinfo_t` structure passed to the `get_idl_variable` function contains valid information or has been cleared (to zeroes) first. If an array of the same size, dimensions, and type is being read into the existing array variable, no allocation is performed and the same space is re-used. For example:

```
/* Assume that:
   X = FLTARR(1000, 1000)
   Y = FLTARR(1000, 1000)
   Z = LONARR(1000, 1000)same size, different type
*/
bzero(&vinfo, sizeof(vinfo));
get_idl_variable(client, "X", &vinfo, 0); /* array allocated */
...
get_idl_variable(client, "Y", &vinfo, 0); /* memory re-used */
...
get_idl_variable(client, "Z", &vinfo, 0); /* array allocated */
free_idl_var(&vinfo);
```

The `get_idl_variable` function calls `free_idl_var` before doing any allocation. So, in the example above, we only needed to free `Z`. `X` and `Y` were freed when we re-used `vinfo`.

Creating a Statically-Allocated Array

It is possible to create a statically-allocated array for receiving information from the server without having the overhead of memory reallocation every time information is received.

If the `Length` field of the `varinfo_t` structure is not zero, it is assumed to be the size of the array data. The `free_idl_var` function will not do anything to a variable where length is non-zero. It is up to the programmer to do their own memory

management if this is the case. Storing a scalar in a static variable (i.e., a variable that has a non-zero `Length` field) fails as does attempting to store an array that does not fit the statically-allocated array. For example:

```
/* X = FLTARR(10)     40 bytes of data (10*4)
   Y = LONARR(2,2,2)  32 bytes of data(2*2*2*4)
   Z = BYTARR(50)     50 bytes of data
   W = 12             scalar
*/
char       buf[40]
varinfo_t  v;
VARIABLE   var;
ARRAY      arr;
/* Build a static array. Fill in the minimum amount of */
/* information required.                               */
v.Variable    = &var;
v.Length      = 40;
var.type      = IDL_TYP_BYTE;
var.flags     = V_ARR;
var.value.arr = &arr;
arr.data      = buf;
get_idl_variable(client, "X", &v, 0);  /* ok */
get_idl_variable(client, "Y", &v, 0);  /* ok */
get_idl_variable(client, "Z", &v, 0);  /* fails – too big */
get_idl_variable(client, "W", &v, 0);  /* fails – scalar */
```

Allocating Space for Strings

All space for strings is assumed to be obtained via `malloc(3)`. This fact is important only when receiving variables (using the `get_idl_variable` function). For example, the following code fragment is valid:

```
v_make_string(&foo, "UGH", "blug");
set_idl_variable(client, &foo);
```

Here is an example of code that will crash your program:

```
v_make_string(&foo, "UGH", "blug");
set_idl_variable(me, &foo);
send_idl_command(me, "UGH='hello world'");
get_idl_variable(me, "UGH", &foo, 0);
```

In this case, the `get_idl_variable` function attempts to free the old resources before allocating new storage. Freeing the constant `blug` results in an error. You could achieve the desired result without an error by changing the first line to:

```
v_make_string(&foo, "UGH", strdup("blug"));
```

RPC Examples

A number of example files are included in the *idldir*`/external/examples/rpc` directory. A `Makefile` for these examples is also included. These short C programs demonstrate the use of the IDL RPC library.