

libcaca  
0.99.beta17

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## Contents

<b>1</b>	<b>libcaca Documentation</b>	<b>1</b>
1.1	Introduction . . . . .	1
1.2	Developer's documentation . . . . .	1
1.3	User's documentation . . . . .	1
1.4	Misc . . . . .	2
1.5	License . . . . .	2
<b>2</b>	<b>Libcaca authors</b>	<b>2</b>
<b>3</b>	<b>Libcaca news</b>	<b>3</b>
3.1	Changes between 0.99.beta17 and 0.99.beta16 . . . . .	3
3.2	Changes between 0.99.beta16 and 0.99.beta15 . . . . .	3
3.3	Changes between 0.99.beta15 and 0.99.beta14 . . . . .	3
3.4	Changes between 0.99.beta14 and 0.99.beta13 . . . . .	3
3.5	Changes between 0.99.beta13 and 0.99.beta12 . . . . .	4
3.6	Changes between 0.99.beta12 and 0.99.beta11 . . . . .	4
3.7	Changes between 0.99.beta11 and 0.99.beta10 . . . . .	4
3.8	Changes between 0.99.beta10 and 0.99.beta9 . . . . .	4
3.9	Changes between 0.99.beta9 and 0.99.beta8 . . . . .	5
3.10	Changes between 0.99.beta8 and 0.99.beta7 . . . . .	5
3.11	Changes between 0.99.beta7 and 0.99.beta6 . . . . .	5
3.12	Changes between 0.99.beta6 and 0.99.beta5 . . . . .	5
3.13	Changes between 0.99.beta5 and 0.99.beta4 . . . . .	5
3.14	Changes between 0.99.beta4 and 0.99.beta3 . . . . .	6
3.15	Changes between 0.99.beta3 and 0.99.beta2 . . . . .	6
3.16	Changes between 0.99.beta2 and 0.99.beta1 . . . . .	6
3.17	Changes between 0.9 and 0.99.beta1 . . . . .	6
3.18	Changes between 0.8 and 0.9 . . . . .	7
3.19	Changes between 0.7 and 0.8 . . . . .	7
3.20	Changes between 0.6 and 0.7 . . . . .	7
3.21	Changes between 0.5 and 0.6 . . . . .	7
3.22	Changes between 0.4 and 0.5 . . . . .	7
3.23	Changes between 0.3 and 0.4 . . . . .	8
3.24	Changes between 0.2 and 0.3 . . . . .	8
3.25	Changes between 0.1 and 0.2 . . . . .	8
3.26	New in 0.1 . . . . .	8

<b>4</b>	<b>Libcaca thanks</b>	<b>8</b>
4.1	Bugfixes and improvements . . . . .	8
4.2	Reused code . . . . .	9
4.3	Porters and packagers . . . . .	9
<b>5</b>	<b>The libcaca canvas format (version 1)</b>	<b>9</b>
<b>6</b>	<b>The libcaca font format (version 1)</b>	<b>10</b>
<b>7</b>	<b>Migrating from libcaca 0.x to the 1.0 API</b>	<b>11</b>
7.1	Overview . . . . .	11
7.2	Migration strategy . . . . .	12
7.3	Function equivalence list . . . . .	12
7.3.1	Basic functions . . . . .	12
7.3.2	Event handling . . . . .	13
7.3.3	Character printing . . . . .	13
7.3.4	Primitives drawing . . . . .	13
7.3.5	Mathematical functions . . . . .	14
7.3.6	Sprite handling . . . . .	14
7.3.7	Bitmap handling . . . . .	14
7.4	Compilation . . . . .	15
<b>8</b>	<b>Libcaca coding style</b>	<b>15</b>
8.1	General guidelines . . . . .	15
8.2	C coding style . . . . .	15
8.3	C++ coding style . . . . .	16
<b>9</b>	<b>A libcaca tutorial</b>	<b>16</b>
<b>10</b>	<b>Libcaca environment variables</b>	<b>17</b>
<b>11</b>	<b>Libcaca ruby bindings</b>	<b>18</b>
11.1	Libcaca Ruby API . . . . .	18
11.1.1	Classes . . . . .	18
11.1.2	Samples . . . . .	20
<b>12</b>	<b>Module Documentation</b>	<b>20</b>
12.1	libcaca attribute definitions . . . . .	20
12.1.1	Detailed Description . . . . .	21
12.1.2	Enumeration Type Documentation . . . . .	21

12.2	libcaca basic functions	22
12.2.1	Detailed Description	23
12.2.2	Function Documentation	23
12.3	libcaca canvas drawing	27
12.3.1	Detailed Description	28
12.3.2	Define Documentation	28
12.3.3	Function Documentation	29
12.4	libcaca dirty rectangle manipulation	34
12.4.1	Detailed Description	35
12.4.2	Function Documentation	35
12.5	libcaca canvas transformation	38
12.5.1	Detailed Description	38
12.5.2	Function Documentation	39
12.6	libcaca attribute conversions	42
12.6.1	Detailed Description	43
12.6.2	Function Documentation	43
12.7	libcaca character set conversions	49
12.7.1	Detailed Description	50
12.7.2	Function Documentation	50
12.8	libcaca primitives drawing	52
12.8.1	Detailed Description	53
12.8.2	Function Documentation	53
12.9	libcaca canvas frame handling	59
12.9.1	Detailed Description	60
12.9.2	Function Documentation	60
12.10	libcaca bitmap dithering	62
12.10.1	Detailed Description	64
12.10.2	Function Documentation	64
12.11	libcaca font handling	72
12.11.1	Detailed Description	73
12.11.2	Function Documentation	73
12.12	libcaca FIGfont handling	75
12.12.1	Detailed Description	76
12.13	libcaca file IO	76
12.13.1	Detailed Description	76
12.13.2	Function Documentation	76

12.14libcaca importers/exporters from/to various . . . . .	79
12.14.1 Detailed Description . . . . .	80
12.14.2 Function Documentation . . . . .	80
12.15libcaca display functions . . . . .	84
12.15.1 Detailed Description . . . . .	85
12.15.2 Function Documentation . . . . .	85
12.16libcaca event handling . . . . .	91
12.16.1 Detailed Description . . . . .	91
12.16.2 Function Documentation . . . . .	92
12.17libcaca DOS conio.h compatibility layer . . . . .	96
12.17.1 Detailed Description . . . . .	98
<b>13 Data Structure Documentation . . . . .</b>	<b>98</b>
13.1 caca_conio_text_info Struct Reference . . . . .	98
13.1.1 Detailed Description . . . . .	99
13.1.2 Field Documentation . . . . .	99
13.2 caca_event Struct Reference . . . . .	100
13.2.1 Detailed Description . . . . .	101
13.2.2 Field Documentation . . . . .	101
<b>14 File Documentation . . . . .</b>	<b>101</b>
14.1 caca.h File Reference . . . . .	101
14.1.1 Detailed Description . . . . .	117
14.1.2 Define Documentation . . . . .	117
14.1.3 Typedef Documentation . . . . .	117
14.1.4 Enumeration Type Documentation . . . . .	118

# 1 libcaca Documentation

## 1.1 Introduction

*libcaca* is a graphics library that outputs text instead of pixels, so that it can work on older video cards or text terminals. It is not unlike the famous AALib library. *libcaca* can use almost any virtual terminal to work, thus it should work on all Unix systems (including Mac OS X) using either the S-Lang library or the ncurses library, on DOS using the conio library, and on Windows systems using the native Win32 console, the conio library, or using S-Lang or ncurses (through Cygwin emulation). There is also a native X11 driver, and an OpenGL driver (through freeglut) that does not require a text terminal. For machines without a screen, the raw driver can be used to send the output to another machine, using for instance cacaserver.

*libcaca* is free software, released under the Do What The Fuck You Want To Public License. This ensures that no one, not even the *libcaca* developers, will ever have anything to say about what you do with the

software. It used to be licensed under the GNU Lesser General Public License, but that was not free enough.

## 1.2 Developer's documentation

The complete *libcaca* programming interface is available from the following header:

- [caca.h](#)

There is language-specific documentation for the various bindings:

- [Libcaca ruby bindings](#)

Some other topics are covered by specific sections:

- [A libcaca tutorial](#)
- [Migrating from libcaca 0.x to the 1.0 API](#)

There is also information specially targeted at *libcaca* developers:

- [The libcaca font format \(version 1\)](#)
- [The libcaca canvas format \(version 1\)](#)
- [Libcaca coding style](#)

## 1.3 User's documentation

- [Libcaca environment variables](#)

## 1.4 Misc

- [Libcaca news](#)
- [Libcaca authors](#)
- [Libcaca thanks](#)

## 1.5 License

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## 2 Libcaca authors

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- cacaball
- OpenGL driver
- Pypycaca Python wrapper
- exporters
- network driver
- C# bindings

John Beppu <[beppu@lbox.org](mailto:beppu@lbox.org)>

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- PHP bindings

Adrien Grand <[jpountz@dinauz.org](mailto:jpountz@dinauz.org)>

- Java bindings

## 3 Libcaca news

### 3.1 Changes between 0.99.beta17 and 0.99.beta16

- new dirty rectangle framework for accelerated rendering
- new <conio.h> compatible header for old DOS software porting
- XCode and Visual Studio build improvements

- Unicode support in the X11 driver
- improved HTML output
- new troff output
- improved Ruby and .NET bindings
- new comprehensive PHP bindings
- new Java bindings
- Cocoa driver enhancements
- support for ANSI colour in FIGlet and TOLlet fonts
- documentation updates
- numerous improvements and bugfixes

### **3.2 Changes between 0.99.beta16 and 0.99.beta15**

- many build fixes, especially for nonstandard platforms

### **3.3 Changes between 0.99.beta15 and 0.99.beta14**

- libcucul was merged back into libcaca for more clarity

### **3.4 Changes between 0.99.beta14 and 0.99.beta13**

- internal FIGlet font support
- use C99 types in public headers
- runtime support for output drivers
- BBcode export support

### **3.5 Changes between 0.99.beta13 and 0.99.beta12**

- device-dependent cursor support
- event API rewrite
- minor API improvements and extensions
- img2txt improvements
- Ruby bindings
- Massive C# bindings improvements
- Python sample code
- Visual Studio build solution



### 3.6 Changes between 0.99.beta12 and 0.99.beta11

- support for 90-degree canvas rotation
- better behaviour when trying to output Unicode on an ASCII terminal
- the built-in font now supports the Geometric Shapes, Halfwidth and Fullwidth Forms and Miscellaneous Symbols Unicode blocks
- new rotozoom effect in cacademo
- Cocoa output driver for Mac OS X
- preliminary .NET bindings
- many bugfixes and documentation changes

### 3.7 Changes between 0.99.beta11 and 0.99.beta10

- fixed compilation of the C++ bindings
- fixed bugs in `cucul_import_memory()`, `cucul_set_canvas_size()`
- implemented [caca\\_set\\_display\\_title\(\)](#) for ncurses and S-Lang
- minor bugfixes

### 3.8 Changes between 0.99.beta10 and 0.99.beta9

- new debug mode
- blitting canvases now makes use of the canvas' handle coordinates
- import functions can read streamed data
- attribute to colorspace transformations
- added katakana and hiragana glyphs to the built-in font
- many bugfixes and documentation changes

### 3.9 Changes between 0.99.beta9 and 0.99.beta8

- support for blink, bold, italics and underline attributes
- allow to import and export zero-sized canvases
- fixed Imlib2 support in cacaview
- fixed buffer overflows in the file importer
- big documentation updates

### 3.10 Changes between 0.99.beta8 and 0.99.beta7

- allow to build the X11 and GL drivers as separate plugins
- support for fullwidth Unicode characters
- improved cucul\_flip() and cucul\_rotate()
- minor bugfixes and documentation updates

### 3.11 Changes between 0.99.beta7 and 0.99.beta6

- transparency support in the UTF-8 importer and exporter
- optimised triangle fill routine
- updated C++ bindings

### 3.12 Changes between 0.99.beta6 and 0.99.beta5

- ANSI importer now handles transparency and UTF-8
- Unicode support was broken for about 10% of the set
- various memory leaks were fixed

### 3.13 Changes between 0.99.beta5 and 0.99.beta4

- implemented cucul\_getchar() and cucul\_get\_color()
- handle transparency in the IRC export
- new cropping and expanding filters
- full Unicode support in the OpenGL driver
- portability fixes for 64-bit architectures, Win32 and MS-DOS
- all demos except cacafire were merged into cacademo

### 3.14 Changes between 0.99.beta4 and 0.99.beta3

- added a compatibility layer for pre-1.x libcaca applications
- fixed manpage generation
- minor bugfixes and documentation updates

### 3.15 Changes between 0.99.beta3 and 0.99.beta2

- libcaca functions use errno for error reporting
- updated C++ bindings
- minor improvements, bugfixes and documentation updates

### 3.16 Changes between 0.99.beta2 and 0.99.beta1

- ANSI importer
- functions use errno for error reporting
- updated C++ bindings
- .NET bindings
- cacadraw, an ANSI viewer that will evolve into an editor
- Unicode input and output support for SLang and ncurses
- built-in fonts work on Win32

### 3.17 Changes between 0.9 and 0.99.beta1

- license switched to WTFPL
- libcaca was split into libcucul, a standalone text manipulation backend, and libcaca, the display and user input frontend
- Unicode support
- TrueColor (more than 16 colours) support
- Floyd-Steinberg dithering
- gamma correction
- export functions for HTML, IRC, ANSI, SVG, PostScript, TGA...
- builtin fonts for device-independent bitmap output
- various text transformation routines (rotation, horizontal flip...)
- OpenGL renderer
- kernel mode to build libcaca programs into a bootable x86 kernel
- cacaserver, a telnet server that can be hooked to libcaca applications
- img2irc, an image to IRC conversion utility

### 3.18 Changes between 0.8 and 0.9

- fix for a buffer overflow in the line rendering
- fixed resizing in the ncurses and slang drivers
- aspect ratio and finer zoom support in cacaview
- minor compilation fixes

### 3.19 Changes between 0.7 and 0.8

- window resizing support
- native Win32 port
- autorepeat emulation in the ncurses and slang drivers
- support for more keycodes in the ncurses and slang drivers
- cacaplas, a plasma animation example
- cacamoir, a moire circles animation example
- MSVC project file

### 3.20 Changes between 0.6 and 0.7

- many bugfixes in the event handling
- cacaball, a metaball animation example

### 3.21 Changes between 0.5 and 0.6

- 30% speed increase in the bitmap rendering routine
- mouse support and various speed optimisations in the X11 driver
- X11 is now the preferred driver
- improved documentation
- minor bugfixes

### 3.22 Changes between 0.4 and 0.5

- palette optimisation for the S-Lang driver to work around the colour pair shortage bug
- minor compilation fix

### 3.23 Changes between 0.3 and 0.4

- preliminary X11 graphics driver
- support for simultaneously compiled-in drivers
- honour the CACA\_DRIVER, CACA\_GEOMETRY and CACA\_FONT environment variables
- more documentation

### 3.24 Changes between 0.2 and 0.3

- antialiasing support
- dithering, antialiasing and background mode can now be selected at runtime or in the environment using the CACA\_BACKGROUND, CACA\_DITHERING and CACA\_ANTIALIASING variables
- alpha channel support in cacaview
- BMP loading support in cacaview even if Imlib2 is not present
- cacafire, a libcaca port of aafire

### 3.25 Changes between 0.1 and 0.2

- rendering now uses 256 colour pairs instead of 16
- mouse support for ncurses
- ncurses is now the preferred backend
- arbitrary color depth and bitmasks in the bitmap renderer
- cacaview, an image viewer based on libcaca

### 3.26 New in 0.1

- initial release
- slang, ncurses and conio drivers
- basic line, box, ellipse and triangle primitives
- colour bitmap blitting

## 4 Libcaca thanks

### 4.1 Bugfixes and improvements

- Gildas Bazin <[gbazin@netcourrier.com](mailto:gbazin@netcourrier.com)> - win32 driver improvements
- Jari Komppa <[jari.komppa@gmail.com](mailto:jari.komppa@gmail.com)> - win32 speed improvements

### 4.2 Reused code

- Jan Hubicka <[hubicka@freesoftware.cz](mailto:hubicka@freesoftware.cz)> - aafire
- Michele Bini <[mibini@tin.it](mailto:mibini@tin.it)> - original SDL plasma
- Free Software Foundation, Inc. - multiboot.S
- Simon Huggins <[webmaster::simonhuggins.com](mailto:webmaster::simonhuggins.com)> - conio-snake

## 4.3 Porters and packagers

- Derk-Jan Hartman <[thedj@users.sourceforge.net](mailto:thedj@users.sourceforge.net)> - Gentoo ebuild file
- Ladislav Hagara <[hgr@vabo.cz](mailto:hgr@vabo.cz)> - Source Mage spell
- Philip Balinov - Slackware package
- Richard Zidlicky <[rz@linux-m68k.org](mailto:rz@linux-m68k.org)> - rpm specfile
- Thomas Klausner <[wiz@NetBSD.org](mailto:wiz@NetBSD.org)> - NetBSD port maintainer
- Vincent Tantardini <[vinc@FreeBSD-fr.org](mailto:vinc@FreeBSD-fr.org)> - FreeBSD port maintainer

## 5 The libcaca canvas format (version 1)

All types are big endian.

```
struct
{
    magic:
        uint8_t caca_header[2];    // "\xCA\xCA"
        uint8_t caca_file_type[2]; // "CV"

    canvas_header:
        uint32_t control_size;      // Control size (canvas_data - canvas_header)
        uint32_t data_size;        // Data size (EOF - canvas_data)

        uint16_t version;          // Canvas format version
                                    // bit 0: set to 1 if canvas is compatible
                                    // with version 1 of the format
                                    // bits 1-15: unused yet, must be 0

        uint32_t frames;          // Frame count

        uint16_t flags;           // Feature flags
                                    // bits 0-15: unused yet, must be 0

    frame_info:
        struct
        {
            uint32_t width;        // Frame width
            uint32_t height;       // Frame height
            uint32_t duration;     // Frame duration in milliseconds, 0 to
                                    // not specify a duration
            uint32_t attr;         // Graphics context attribute
            int32_t cursor_x;      // Cursor X coordinate
            int32_t cursor_y;      // Cursor Y coordinate
            int32_t handle_x;      // Handle X coordinate
            int32_t handle_y;      // Handle Y coordinate
        }
        frame_list[frames];

    control_extension_1:
    control_extension_2:
    ...
    control_extension_N:
    ...                          // reserved for future use

    canvas_data:
        uint8_t data[data_size];  // canvas data

    data_extension_1:
```

```

data_extension_2:
    ...
data_extension_N:
    ...                // reserved for future use
};

```

## 6 The libcaca font format (version 1)

All types are big endian.

```

struct
{
    magic:
        uint8_t caca_header[2];    // "\xCA\xCA"
        uint8_t caca_file_type[2]; // "FT"

    font_header:
        uint32_t control_size;      // Control size (font_data - font_header)
        uint32_t data_size;        // Data size (EOF - font_data)

        uint16_t version;          // Font format version
                                    // bit 0: set to 1 if font is compatible
                                    //         with version 1 of the format
                                    // bits 1-15: unused yet, must be 0

        uint16_t blocks;          // Number of blocks in the font
        uint32_t glyphs;          // Total number of glyphs in the font

        uint16_t bpp;             // Bits per pixel for glyph data (valid
                                    // Values are 1, 2, 4 and 8)

        uint16_t width;           // Standard glyph width
        uint16_t height;          // Standard glyph height
        uint16_t maxwidth;        // Maximum glyph width
        uint16_t maxheight;       // Maximum glyph height

        uint16_t flags;           // Feature flags
                                    // bit 0: set to 1 if font is fixed width
                                    // bits 1-15: unused yet, must be 0

    block_info:
        struct
        {
            uint32_t start;        // Unicode index of the first glyph
            uint32_t stop;         // Unicode index of the last glyph + 1
            uint32_t index;        // Glyph info index of the first glyph
        }
        block_list[blocks];

    glyph_info:
        struct
        {
            uint16_t width;        // Glyph width in pixels
            uint16_t height;       // Glyph height in pixels
            uint32_t data_offset;   // Offset (starting from data) to the data
                                    // for the first character
        }
        glyph_list[glyphs];

    control_extension_1:
    control_extension_2:
        ...
    control_extension_N:
        ...                // reserved for future use

```

```
font_data:
    uint8_t data[data_size];    // glyph data

data_extension_1:
data_extension_2:
    ...
data_extension_N:
    ...                        // reserved for future use
};
```

## 7 Migrating from libcaca 0.x to the 1.0 API

This section will guide you through the migration of a *libcaca* 0.x application to the latest API version.

### 7.1 Overview

The most important change in the 1.0 API of *libcaca* is the object-oriented design. See these two examples for a rough idea of what changed:

<pre>#include &lt;caca.h&gt;  /* libcaca program - 0.x API */ int main(void) {     /* Initialise libcaca */     caca_init();     /* Set window title */     caca_set_window_title("Window");     /* Choose drawing colours */     caca_set_color(CACA_COLOR_BLACK,                   CACA_COLOR_WHITE);     /* Draw a string at (0, 0) */     caca_putstr(0, 0, "Hello world!");     /* Refresh display */     caca_refresh();     /* Wait for a key press event */     caca_wait_event(CACA_EVENT_KEY_PRESS);     /* Clean up library */     caca_end();      return 0; }</pre>	<pre>#include &lt;caca.h&gt;  /* libcaca program - 1.0 API */ int main(void) {     /* Initialise libcaca */     caca_canvas_t *cv;     caca_display_t *dp;     dp = caca_create_display(NULL);     cv = caca_get_canvas(dp);     /* Set window title */     caca_set_display_title(dp, "Window");     /* Choose drawing colours */     caca_set_color_ansi(cv, CACA_BLACK,                        CACA_WHITE);     /* Draw a string at (0, 0) */     caca_put_str(cv, 0, 0, "Hello world!");     /* Refresh display */     caca_refresh_display();     /* Wait for a key press event */     caca_get_event(dp, CACA_EVENT_KEY_PRESS,                   NULL, -1);     /* Clean up library */     caca_free_display(dp);      return 0; }</pre>
--	--

Note the following important things:

- Most functions now take an object handle as their first argument.

### 7.2 Migration strategy

You have two ways to migrate your application to use *libcaca* 1.x:



- Port your code using the function equivalence list. This is the preferred way because new functions are thread safe and offer much more features to both the programmer and the end user.
- Use the legacy compatibility layer.

Using the compatibility layer is as easy as adding the following three lines:

```
#include <caca.h>

/* libcaca program - 0.x API */
...
```

```
#include <caca.h>
#ifdef CACA_API_VERSION_1
#    include <caca0.h>
#endif

/* libcaca program - 0.x API */
...
```

The modified code is guaranteed to build both with *libcaca* 0.x and *libcaca* 1.0.

## 7.3 Function equivalence list

### 7.3.1 Basic functions

- **caca\_init()**: use [caca\\_create\\_canvas\(\)](#) to create a *libcaca* canvas, followed by [caca\\_create\\_display\(\)](#) to attach a *libcaca* display to it. Alternatively, [caca\\_create\\_display\(\)](#) with a NULL argument will create a canvas automatically.
- **caca\_set\_delay()**: use [caca\\_set\\_display\\_time\(\)](#).
- **caca\_get\_feature()**: deprecated.
- **caca\_set\_feature()**: deprecated, see [caca\\_set\\_dither\\_antialias\(\)](#), [caca\\_set\\_dither\\_color\(\)](#) and [caca\\_set\\_dither\\_mode\(\)](#) instead.
- **caca\_get\_feature\_name()**: deprecated, see [caca\\_get\\_dither\\_mode\\_list\(\)](#), [caca\\_get\\_dither\\_antialias\\_list\(\)](#) and [caca\\_get\\_dither\\_color\\_list\(\)](#) instead.
- **caca\_get\_rendertime()**: use [caca\\_get\\_display\\_time\(\)](#).
- **caca\_get\_width()**: use [caca\\_get\\_canvas\\_width\(\)](#).
- **caca\_get\_height()**: use [caca\\_get\\_canvas\\_height\(\)](#).
- **caca\_set\_window\_title()**: use [caca\\_set\\_display\\_title\(\)](#).
- **caca\_get\_window\_width()**: use [caca\\_get\\_display\\_width\(\)](#).
- **caca\_get\_window\_height()**: use [caca\\_get\\_display\\_height\(\)](#).
- **caca\_refresh()**: use [caca\\_refresh\\_display\(\)](#).
- **caca\_end()**: use [caca\\_free\\_display\(\)](#) to detach the *libcaca* display, followed by [caca\\_free\\_canvas\(\)](#) to free the underlying *libcaca* canvas. Alternatively, if the canvas was created by [caca\\_create\\_display\(\)](#), it will be automatically destroyed by [caca\\_free\\_display\(\)](#).

### 7.3.2 Event handling

- [caca\\_get\\_event\(\)](#): unchanged, but the event information retrieval changed a lot.
- [caca\\_wait\\_event\(\)](#): use [caca\\_get\\_event\(\)](#) with a `timeout` argument of `-1`.
- [caca\\_get\\_mouse\\_x\(\)](#): unchanged.
- [caca\\_get\\_mouse\\_y\(\)](#): unchanged.

### 7.3.3 Character printing

- [caca\\_set\\_color\(\)](#): use [caca\\_set\\_color\\_ansi\(\)](#) or [caca\\_set\\_color\\_argb\(\)](#).
- [caca\\_get\\_fg\\_color\(\)](#): use [caca\\_get\\_attr\(\)](#).
- [caca\\_get\\_bg\\_color\(\)](#): use [caca\\_get\\_attr\(\)](#).
- [caca\\_get\\_color\\_name\(\)](#): this function is now deprecated due to major uselessness.
- [caca\\_putchar\(\)](#): use [caca\\_put\\_char\(\)](#).
- [caca\\_putstr\(\)](#): use [caca\\_put\\_str\(\)](#).
- [caca\\_printf\(\)](#): unchanged.
- [caca\\_clear\(\)](#): use [caca\\_clear\\_canvas\(\)](#).

### 7.3.4 Primitives drawing

These functions are almost unchanged, except for Unicode support and the fact that they now act on a given canvas.

- [caca\\_draw\\_line\(\)](#): unchanged.
- [caca\\_draw\\_polyline\(\)](#): unchanged.
- [caca\\_draw\\_thin\\_line\(\)](#): unchanged.
- [caca\\_draw\\_thin\\_polyline\(\)](#): unchanged.
- [caca\\_draw\\_circle\(\)](#): unchanged.
- [caca\\_draw\\_ellipse\(\)](#): unchanged.
- [caca\\_draw\\_thin\\_ellipse\(\)](#): unchanged.
- [caca\\_fill\\_ellipse\(\)](#): unchanged.
- [caca\\_draw\\_box\(\)](#): unchanged, but the argument meaning changed (width and height instead of corner coordinates).
- [caca\\_draw\\_thin\\_box\(\)](#): use [caca\\_draw\\_thin\\_box\(\)](#) or [caca\\_draw\\_cp437\\_box\(\)](#), also the argument meaning changed (width and height instead of corner coordinates).
- [caca\\_fill\\_box\(\)](#): unchanged, but the argument meaning changed (width and height instead of corner coordinates).

- [caca\\_draw\\_triangle\(\)](#): unchanged.
- [caca\\_draw\\_thin\\_triangle\(\)](#): unchanged.
- [caca\\_fill\\_triangle\(\)](#): unchanged.

### 7.3.5 Mathematical functions

- [caca\\_rand\(\)](#): unchanged, but the second argument is different, make sure you take that into account.
- [caca\\_sqrt\(\)](#): this function is now deprecated, use your system's [sqrt\(\)](#) call instead.

### 7.3.6 Sprite handling

The newly introduced canvases can have several frames. Sprites are hence completely deprecated.

- [caca\\_load\\_sprite\(\)](#): use [caca\\_import\\_file\(\)](#).
- [caca\\_get\\_sprite\\_frames\(\)](#): use [caca\\_get\\_frame\\_count\(\)](#).
- [caca\\_get\\_sprite\\_width\(\)](#): use [caca\\_get\\_canvas\\_width\(\)](#).
- [caca\\_get\\_sprite\\_height\(\)](#): use [caca\\_get\\_canvas\\_height\(\)](#).
- [caca\\_get\\_sprite\\_dx\(\)](#): use [caca\\_get\\_canvas\\_handle\\_x\(\)](#).
- [caca\\_get\\_sprite\\_dy\(\)](#): use [caca\\_get\\_canvas\\_handle\\_y\(\)](#).
- [caca\\_draw\\_sprite\(\)](#): use [caca\\_set\\_frame\(\)](#) and [caca\\_blit\(\)](#).
- [caca\\_free\\_sprite\(\)](#): use [caca\\_free\\_canvas\(\)](#).

### 7.3.7 Bitmap handling

Bitmaps have been renamed to dithers, because these objects do not in fact store any pixels, they just have information on how bitmaps will be dithered.

- [caca\\_create\\_bitmap\(\)](#): use [caca\\_create\\_dither\(\)](#).
- [caca\\_set\\_bitmap\\_palette\(\)](#): use [caca\\_set\\_dither\\_palette\(\)](#).
- [caca\\_draw\\_bitmap\(\)](#): use [caca\\_dither\\_bitmap\(\)](#).
- [caca\\_free\\_bitmap\(\)](#): use [caca\\_free\\_dither\(\)](#).

## 7.4 Compilation

The `caca-config` utility is deprecated in favour of the standard `pkg-config` interface:

```
gcc -c foobar.c -o foobar.o `pkg-config --cflags caca`  
gcc foobar.o -o foobar `pkg-config --libs caca`
```

`caca-config` is still provided as a convenience tool but may be removed in the future.

## 8 Libcaca coding style

### 8.1 General guidelines

A pretty safe rule of thumb is: look at what has already been done and try to do the same.

- Tabulations should be avoided and replaced with *eight* spaces.
- Indentation is generally 4 spaces.
- Lines should wrap at most at 79 characters.
- Do not leave whitespace at the end of lines.
- Do not use multiple spaces for anything else than indentation.
- Code qui fait des warnings == code de porc == deux baffes dans ta gueule

### 8.2 C coding style

Try to use short names whenever possible (*i* for indices, *w* for width, *cv* for canvas...). Macros are always uppercase, variable and function names are always lowercase. Use the underscore to separate words within names:

```
#define BROKEN 0
#define MAX(x, y) ((x > y) ? (x) : (y))

unsigned int x, y, w, h;
char *font_name;
void frobulate_every_three_seconds(void);
```

`const` is a *suffix*. It's `char const *foo`, not `const char *foo`.

Use spaces after commas and between operators. Do not use spaces after an opening parenthesis or before a closing one:

```
a += 2;
b = (a * (c + d));
x = min(x1, x2, x3);
```

Do not put a space between functions and the corresponding opening parenthesis:

```
int function(int);
```

A space can be inserted after keywords such as `for`, `while` or `if`, but consistency with the rest of the page is encouraged:

```
if(a == b)
    return;

if (p == NULL)
```

Do not put parentheses around return values:

```
return a + (b & x) + d[10];
```

Opening braces should be on a line of their own, aligned with the current block. Braces are optional for one-liners:

```
int function(int a)
{
    if(a & 0x84)
        return a;

    if(a < 0)
    {
        return -a;
    }
    else
    {
        a /= 2;

        switch(a)
        {
            case 0:
            case 1:
                return -1;
                break;
            default:
                return a;
        }
    }
}
```

## 8.3 C++ coding style

Nothing here yet.

## 9 A libcaca tutorial

First, a very simple working program, to check for basic libcaca functionalities.

```
#include <caca.h>

int main(void)
{
    caca_canvas_t *cv; caca_display_t *dp; caca_event_t ev;

    dp = caca_create_display(NULL);
    if(!dp) return 1;
    cv = caca_get_canvas(dp);

    caca_set_display_title(dp, "Hello!");
    caca_set_color_ansi(cv, CACA_BLACK, CACA_WHITE);
    caca_put_str(cv, 0, 0, "This is a message");
    caca_refresh_display(dp);
    caca_get_event(dp, CACA_EVENT_KEY_PRESS, &ev, -1);
    caca_free_display(dp);

    return 0;
}
```

What does it do?

- Create a display. Physically, the display is either a window or a context in a terminal (ncurses, slang) or even the whole screen (VGA).

- Get the display's associated canvas. A canvas is the surface where everything happens: writing characters, sprites, strings, images... It is unavoidable. Here the size of the canvas is set by the display.
- Set the display's window name (only available in windowed displays, does nothing otherwise).
- Set the current canvas colours to black background and white foreground.
- Write the string "This is a message" onto the canvas, using the current colour pair.
- Refresh the display, causing the text to be effectively displayed.
- Wait for an event of type `CACA_EVENT_KEY_PRESS`.
- Free the display (release memory). Since it was created together with the display, the canvas will be automatically freed as well.

You can then compile this code on an UNIX-like system using the following commands (requiring `pkg-config` and `gcc`):

```
gcc `pkg-config --libs --cflags caca` example.c -o example
```

## 10 Libcaca environment variables

Some environment variables can be used to change the behaviour of *libcaca* without having to modify the program which uses it. These variables are:

- **CACA\_DRIVER:** set the backend video driver. In order of preference:
  - `conio` uses the DOS `conio.h` interface.
  - `ncurses` uses the `ncurses` library.
  - `slang` uses the `S-Lang` library.
  - `x11` uses the native X11 driver.
  - `gl` uses `freeglut` and `opengl` libraries.
  - `raw` outputs to the standard output instead of rendering the canvas. This is can be used together with `cacaserver`.
- **CACA\_GEOMETRY:** set the video display size. The format of this variable must be `XxY`, with `X` and `Y` being integer values. This option currently works with the `raw`, `X11` and `GL` drivers.
- **CACA\_FONT:** set the rendered font. The format of this variable is implementation dependent, but since it currently only works with the `X11` driver, an `X11` font name such as `fixed` or `5x7` is expected.

## 11 Libcaca ruby bindings

There is no real documentation yet for the Ruby binding but `methods` on any object should help you :)

I tried to follow Ruby spirit meaning that :

- most of the methods return `self`

- the methods `set_foo` with only an argument are also available as `foo=` (returning the value instead of `self`)
- the methods originally named `get_foo` are available only as `foo`

For the list of methods and some sample code, read:

[Libcaca Ruby API](#)

## 11.1 Libcaca Ruby API

### 11.1.1 Classes

The classes available for libcaca are :

- **Caca::Canvas** : functions that have a `caca_canvas_t*` as first argument
- **Caca::Dither** : functions that have a `caca_dither_t*` as first argument
- **Caca::Font** : functions that have a `caca_font_t*` as first argument (The constructor can currently only accept the name of a builtin font)
- **Caca::Display**
- **Caca::Event**
- **Caca::Event::Key**
- **Caca::Event::Key::Press**
- **Caca::Event::Key::Release**
- **Caca::Event::Mouse**
- **Caca::Event::Mouse::Press**
- **Caca::Event::Mouse::Release**
- **Caca::Event::Mouse::Motion**
- **Caca::Event::Resize**
- **Caca::Event::Quit**

The character set conversion functions are not available yet in the binding.

```
$ irb -rcaca
irb(main):001:0> class Object
irb(main):002:1> def Object.my_instance_methods
irb(main):003:2> instance_methods.sort - ancestors[1].instance_methods
irb(main):004:2> end
irb(main):005:1> def Object.my_methods
irb(main):006:2> methods.sort - ancestors[1].methods
irb(main):007:2> end
irb(main):008:1> end

irb(main):009:0> Caca.constants
=> ["BROWN", "BOLD", "GREEN", "LIGHTMAGENTA", "LIGHTBLUE", "BLINK",
"MAGENTA", "DEFAULT", "TRANSPARENT", "BLUE", "LIGHTRED", "DARKGRAY",
"UNDERLINE", "RED", "WHITE", "BLACK", "LIGHTCYAN", "LIGHTGRAY",
"ITALICS", "CYAN", "YELLOW", "LIGHTGREEN", "Canvas", "Dither", "Font"]
```

```

irb(main):010:0> Caca.my_methods
=> ["version"]

irb(main):011:0> Caca::Canvas.my_methods
=> ["export_list", "import_list"]

irb(main):012:0> Caca::Canvas.my_instance_methods
=> ["attr=", "blit", "clear", "create_frame",
"dither_bitmap", "draw_box", "draw_circle", "draw_cp437_box", "draw_ellipse",
"draw_line", "draw_polyline", "draw_thin_box", "draw_thin_ellipse",
"draw_thin_line", "draw_thin_polyline", "draw_thin_triangle",
"draw_triangle", "export_to_memory", "fill_box", "fill_ellipse",
"fill_triangle", "flip", "flop", "frame=", "frame_count", "frame_name",
"frame_name=", "free_frame", "get_attr", "get_char", "gotoxy",
"handle_x", "handle_y", "height", "height=", "import_file",
"import_from_memory", "invert", "printf", "put_attr", "put_char", "put_str",
"rotate_180", "rotate_left", "rotate_right", "set_attr",
"set_boundaries", "set_color_ansi", "set_color_argb", "set_frame",
"set_frame_name", "set_handle", "set_height", "set_size", "set_width",
"stretch_left", "stretch_right", "wherex", "wherey", "width", "width="]

irb(main):013:0> Caca::Font.my_methods
=> ["list"]

irb(main):014:0> Caca::Font.my_instance_methods
=> ["blocks", "height", "width"]

irb(main):015:0> Caca::Dither.my_instance_methods
=> ["algorithm=", "algorithm_list", "antialias=", "antialias_list",
"brightness=", "charset=", "charset_list", "color=", "color_list",
"contrast=", "gamma=", "palette=", "set_algorithm", "set_antialias",
"set_brightness", "set_charset", "set_color", "set_contrast",
"set_gamma", "set_palette"]

irb(main):010:0> Caca::Display.my_instance_methods
=> ["canvas", "get_event", "height", "mouse=", "mouse_x", "mouse_y", "refresh",
"set_mouse", "set_time", "set_title", "time", "time=", "title=", "width"]

irb(main):011:0> Caca::Event.constants
=> ["Key", "Quit", "TYPE", "Mouse", "Resize"]

irb(main):012:0> Caca::Event.my_instance_methods
=> ["quit?"]

irb(main):013:0> Caca::Event::Key.my_instance_methods
=> ["ch", "utf32", "utf8"]

irb(main):014:0> Caca::Event::Mouse.my_instance_methods
=> ["button", "x", "y"]

irb(main):015:0> Caca::Event::Resize.my_instance_methods
=> ["w", "h"]

```

### 11.1.2 Samples

```

$ ruby -rcaca -e 'c=Caca::Canvas.new(6, 3).fill_box(0,0,2,2,"#[0]);
c2=Caca::Canvas.new(1,1).put_str(0,0,"x"); c.blit(1,1,c2); puts
c.export_to_memory("irc")'
###
#x#
###

```



```

$ ruby -e 'puts Caca::Canvas.new(6,3).draw_thin_polyline([[0,0], [0,2],
[5,2],[0,0]]).export_to_memory("irc")'
- .
| \.
----\_

$ ruby -rcaca -e 'p Caca::Canvas.export_list'
[["caca", "native libcaca format"], ["ansi", "ANSI"], ["utf8", "UTF-8
withANSI escape codes"], ["utf8cr", "UTF-8 with ANSI escape codes and
MS-DOS\\r"], ["html", "HTML"], ["html3", "backwards-compatible HTML"],
["irc", "IRC with mIRC colours"], ["ps", "PostScript document"], ["svg",
"SVGvector image"], ["tga", "TGA image"]]

$ ruby -rcaca -e 'p Caca::Font.list'
["Monospace9", "Monospace Bold 12"]

require 'caca'
c = Caca::Canvas.new(20,10)
c.put_str(2,3, "plop!")
c.draw_thin_polyline([[0,0],[0,2], [5,2], [0,0]])
d = Caca::Display.new(c)
d.title= "Test !"
d.refresh

#Redefine Event::Key#quit? so that q, Q, and Esc become exit keys
module Caca
  class Event::Key
    def quit?
      "qQ^[\".split('').member?(@ch.chr)
    end
  end
end

while((e= d.get_event(Caca::Event, -1)) && ! e.quit?)
  p e
  d.refresh
end

```

## 12 Module Documentation

### 12.1 libcaca attribute definitions

#### Enumerations

- enum `caca_color` {
  - `CACA_BLACK` = 0x00,
  - `CACA_BLUE` = 0x01,
  - `CACA_GREEN` = 0x02,
  - `CACA_CYAN` = 0x03,
  - `CACA_RED` = 0x04,
  - `CACA_MAGENTA` = 0x05,
  - `CACA_BROWN` = 0x06,
  - `CACA_LIGHTGRAY` = 0x07,
  - `CACA_DARKGRAY` = 0x08,
  - `CACA_LIGHTBLUE` = 0x09,

```

CACA_LIGHTGREEN = 0x0a,
CACA_LIGHTCYAN = 0x0b,
CACA_LIGHTRED = 0x0c,
CACA_LIGHTMAGENTA = 0x0d,
CACA_YELLOW = 0x0e,
CACA_WHITE = 0x0f,
CACA_DEFAULT = 0x10,
CACA_TRANSPARENT = 0x20 }
• enum caca_style {
CACA_BOLD = 0x01,
CACA_ITALICS = 0x02,
CACA_UNDERLINE = 0x04,
CACA_BLINK = 0x08 }

```

### 12.1.1 Detailed Description

Colours and styles that can be used with `caca_set_attr()`.

### 12.1.2 Enumeration Type Documentation

#### 12.1.2.1 enum caca\_color

*libcaca* colour keyword

#### Enumerator:

**CACA\_BLACK** The colour index for black.  
**CACA\_BLUE** The colour index for blue.  
**CACA\_GREEN** The colour index for green.  
**CACA\_CYAN** The colour index for cyan.  
**CACA\_RED** The colour index for red.  
**CACA\_MAGENTA** The colour index for magenta.  
**CACA\_BROWN** The colour index for brown.  
**CACA\_LIGHTGRAY** The colour index for light gray.  
**CACA\_DARKGRAY** The colour index for dark gray.  
**CACA\_LIGHTBLUE** The colour index for blue.  
**CACA\_LIGHTGREEN** The colour index for light green.  
**CACA\_LIGHTCYAN** The colour index for light cyan.  
**CACA\_LIGHTRED** The colour index for light red.  
**CACA\_LIGHTMAGENTA** The colour index for light magenta.  
**CACA\_YELLOW** The colour index for yellow.  
**CACA\_WHITE** The colour index for white.  
**CACA\_DEFAULT** The output driver's default colour.  
**CACA\_TRANSPARENT** The transparent colour.

### 12.1.2.2 enum caca\_style

*libcaca* style keyword

#### Enumerator:

- CACA\_BOLD** The style mask for bold.
- CACA\_ITALICS** The style mask for italics.
- CACA\_UNDERLINE** The style mask for underline.
- CACA\_BLINK** The style mask for blink.

## 12.2 libcaca basic functions

### Functions

- `__extern caca_canvas_t * caca_create_canvas (int, int)`  
*Initialise a libcaca canvas.*
- `__extern int caca_manage_canvas (caca_canvas_t *, int(*) (void *), void *)`  
*Manage a canvas.*
- `__extern int caca_unmanage_canvas (caca_canvas_t *, int(*) (void *), void *)`  
*unmanage a canvas.*
- `__extern int caca_set_canvas_size (caca_canvas_t *, int, int)`  
*Resize a canvas.*
- `__extern int caca_get_canvas_width (caca_canvas_t const *)`  
*Get the canvas width.*
- `__extern int caca_get_canvas_height (caca_canvas_t const *)`  
*Get the canvas height.*
- `__extern uint32_t const * caca_get_canvas_chars (caca_canvas_t const *)`  
*Get the canvas character array.*
- `__extern uint32_t const * caca_get_canvas_attrs (caca_canvas_t const *)`  
*Get the canvas attribute array.*
- `__extern int caca_free_canvas (caca_canvas_t *)`  
*Free a libcaca canvas.*
- `__extern int caca_rand (int, int)`  
*Generate a random integer within a range.*
- `__extern char const * caca_get_version (void)`  
*Return the libcaca version.*

### 12.2.1 Detailed Description

These functions provide the basic *libcaca* routines for library initialisation, system information retrieval and configuration.

### 12.2.2 Function Documentation

#### 12.2.2.1 `__extern caca_canvas_t* caca_create_canvas (int width, int height)`

Initialise internal *libcaca* structures and the backend that will be used for subsequent graphical operations. It must be the first *libcaca* function to be called in a function. `caca_free_canvas()` should be called at the end of the program to free all allocated resources.

Both the cursor and the canvas' handle are initialised at the top-left corner.

If an error occurs, NULL is returned and **errno** is set accordingly:

- **EINVAL** Specified width or height is invalid.
- **ENOMEM** Not enough memory for the requested canvas size.

#### Parameters:

*width* The desired canvas width  
*height* The desired canvas height

#### Returns:

A libcaca canvas handle upon success, NULL if an error occurred.

References CACA\_DEFAULT, `caca_set_color_ansi()`, and CACA\_TRANSPARENT.

Referenced by `caca_canvas_set_figfont()`, `caca_conio_movetext()`, `caca_create_display_with_driver()`, `caca_export_area_to_memory()`, `caca_import_area_from_file()`, `caca_import_area_from_memory()`, and `caca_set_canvas_boundaries()`.

#### 12.2.2.2 `__extern int caca_manage_canvas (caca_canvas_t * cv, int(*)(void *) callback, void * p)`

Lock a canvas to prevent it from being resized. If non-NULL, the *callback* function pointer will be called upon each `caca_set_canvas_size` call and if the returned value is zero, the canvas resize request will be denied.

This function is only useful for display drivers such as the *libcaca* library.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EBUSY** The canvas is already being managed.

#### Parameters:

*cv* A libcaca canvas.  
*callback* An optional callback function pointer.

*p* The argument to be passed to *callback*.

#### Returns:

0 in case of success, -1 if an error occurred.

Referenced by `caca_create_display_with_driver()`.

#### 12.2.2.3 `__extern int caca_unmanage_canvas (caca_canvas_t * cv, int(*) (void *) callback, void * p)`

unlock a canvas previously locked by `caca_manage_canvas()`. for safety reasons, the callback and callback data arguments must be the same as for the `caca_manage_canvas()` call.

this function is only useful for display drivers such as the *libcaca* library.

if an error occurs, -1 is returned and **errno** is set accordingly:

- `EINVAL` the canvas is not managed, or the callback arguments do not match.

#### Parameters:

*cv* a libcaca canvas.

*callback* the *callback* argument previously passed to `caca_manage_canvas()`.

*p* the *p* argument previously passed to `caca_manage_canvas()`.

#### Returns:

0 in case of success, -1 if an error occurred.

Referenced by `caca_create_display_with_driver()`, and `caca_free_display()`.

#### 12.2.2.4 `__extern int caca_set_canvas_size (caca_canvas_t * cv, int width, int height)`

Set the canvas' width and height, in character cells.

The contents of the canvas are preserved to the extent of the new canvas size. Newly allocated character cells at the right and/or at the bottom of the canvas are filled with spaces.

If as a result of the resize the cursor coordinates fall outside the new canvas boundaries, they are readjusted. For instance, if the current X cursor coordinate is 11 and the requested width is 10, the new X cursor coordinate will be 10.

It is an error to try to resize the canvas if an output driver has been attached to the canvas using `caca_create_display()`. You need to remove the output driver using `caca_free_display()` before you can change the canvas size again. However, the caca output driver can cause a canvas resize through user interaction. See the `caca_event()` documentation for more about this.

If an error occurs, -1 is returned and **errno** is set accordingly:

- `EINVAL` Specified width or height is invalid.
- `EBUSY` The canvas is in use by a display driver and cannot be resized.

- `ENOMEM` Not enough memory for the requested canvas size. If this happens, the canvas handle becomes invalid and should not be used.

**Parameters:**

*cv* A libcaca canvas.  
*width* The desired canvas width.  
*height* The desired canvas height.

**Returns:**

0 in case of success, -1 if an error occurred.

Referenced by `caca_canvas_set_figfont()`, `caca_flush_figlet()`, and `caca_put_figchar()`.

**12.2.2.5 `__extern int caca_get_canvas_width (caca_canvas_t const * cv)`**

Return the current canvas' width, in character cells.

This function never fails.

**Parameters:**

*cv* A libcaca canvas.

**Returns:**

The canvas width.

Referenced by `caca_conio_clreol()`, `caca_conio_movetext()`, and `caca_get_mouse_x()`.

**12.2.2.6 `__extern int caca_get_canvas_height (caca_canvas_t const * cv)`**

Returns the current canvas' height, in character cells.

This function never fails.

**Parameters:**

*cv* A libcaca canvas.

**Returns:**

The canvas height.

Referenced by `caca_flush_figlet()`, and `caca_get_mouse_y()`.

**12.2.2.7 `__extern uint32_t const* caca_get_canvas_chars (caca_canvas_t const * cv)`**

Return the current canvas' internal character array. The array elements consist in native endian 32-bit Unicode values as returned by `caca_get_char()`.

This function is probably only useful for *libcaca* 's internal display drivers.

This function never fails.

**Parameters:**

*cv* A libcaca canvas.

**Returns:**

The canvas character array.

#### 12.2.2.8 `__extern uint32_t const* caca_get_canvas_attrs (caca_canvas_t const * cv)`

Returns the current canvas' internal attribute array. The array elements consist in native endian 32-bit attribute values as returned by [caca\\_get\\_attr\(\)](#).

This function is probably only useful for *libcaca* 's internal display drivers.

This function never fails.

**Parameters:**

*cv* A libcaca canvas.

**Returns:**

The canvas attribute array.

#### 12.2.2.9 `__extern int caca_free_canvas (caca_canvas_t * cv)`

Free all resources allocated by [caca\\_create\\_canvas\(\)](#). The canvas pointer becomes invalid and must no longer be used unless a new call to [caca\\_create\\_canvas\(\)](#) is made.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EBUSY** The canvas is in use by a display driver and cannot be freed.

**Parameters:**

*cv* A libcaca canvas.

**Returns:**

0 in case of success, -1 if an error occurred.

References [caca\\_canvas\\_set\\_figfont\(\)](#).

Referenced by [caca\\_canvas\\_set\\_figfont\(\)](#), [caca\\_create\\_display\\_with\\_driver\(\)](#), [caca\\_export\\_area\\_to\\_memory\(\)](#), [caca\\_free\\_display\(\)](#), [caca\\_import\\_area\\_from\\_file\(\)](#), and [caca\\_import\\_area\\_from\\_memory\(\)](#).

#### 12.2.2.10 `__extern int caca_rand (int min, int max)`

Generate a random integer within the given range.

This function never fails.

##### Parameters:

- min* The lower bound of the integer range.
- max* The upper bound of the integer range.

##### Returns:

A random integer comprised between `min` and `max - 1` (inclusive).

#### 12.2.2.11 `__extern char const* caca_get_version (void)`

Return a read-only string with the *libcaca* version information.

This function never fails.

##### Returns:

The *libcaca* version information.

## 12.3 libcaca canvas drawing

### Defines

- `#define CACA_MAGIC_FULLWIDTH 0x000ffffe`

### Functions

- `__extern int caca_gotoxy (caca_canvas_t *, int, int)`  
*Set cursor position.*
- `__extern int caca_wherex (caca_canvas_t const *)`  
*Get X cursor position.*
- `__extern int caca_wherey (caca_canvas_t const *)`  
*Get Y cursor position.*
- `__extern int caca_put_char (caca_canvas_t *, int, int, uint32_t)`  
*Print an ASCII or Unicode character.*
- `__extern uint32_t caca_get_char (caca_canvas_t const *, int, int)`  
*Get the Unicode character at the given coordinates.*
- `__extern int caca_put_str (caca_canvas_t *, int, int, char const *)`



*Print a string.*

- `__extern int caca_printf (caca_canvas_t *, int, int, char const *,...)`  
*Print a formatted string.*
- `__extern int caca_vprintf (caca_canvas_t *, int, int, char const *, va_list)`  
*Print a formatted string (va\_list version).*
- `__extern int caca_clear_canvas (caca_canvas_t *)`  
*Clear the canvas.*
- `__extern int caca_set_canvas_handle (caca_canvas_t *, int, int)`  
*Set cursor handle.*
- `__extern int caca_get_canvas_handle_x (caca_canvas_t const *)`  
*Get X handle position.*
- `__extern int caca_get_canvas_handle_y (caca_canvas_t const *)`  
*Get Y handle position.*
- `__extern int caca_blit (caca_canvas_t *, int, int, caca_canvas_t const *, caca_canvas_t const *)`  
*Blit a canvas onto another one.*
- `__extern int caca_set_canvas_boundaries (caca_canvas_t *, int, int, int, int)`  
*Set a canvas' new boundaries.*

### 12.3.1 Detailed Description

These functions provide low-level character printing routines and higher level graphics functions.

### 12.3.2 Define Documentation

#### 12.3.2.1 `#define CACA_MAGIC_FULLWIDTH 0x000ffffe`

Used to indicate that the previous character was a fullwidth glyph.

Referenced by `caca_blit()`, `caca_flip()`, `caca_put_attr()`, `caca_put_char()`, and `caca_rotate_180()`.

### 12.3.3 Function Documentation

#### 12.3.3.1 `__extern int caca_gotoxy (caca_canvas_t * cv, int x, int y)`

Put the cursor at the given coordinates. Functions making use of the cursor will use the new values. Setting the cursor position outside the canvas is legal but the cursor will not be shown.

This function never fails.

**Parameters:**

*cv* A handle to the libcaca canvas.

*x* X cursor coordinate.

*y* Y cursor coordinate.

**Returns:**

This function always returns 0.

Referenced by `caca_conio_cgets()`, `caca_conio_clrscr()`, `caca_conio_cprintf()`, `caca_conio_cputs()`, `caca_conio_gotoxy()`, `caca_conio_printf()`, and `caca_conio_putch()`.

**12.3.3.2 `__extern int caca_wherex (caca_canvas_t const * cv)`**

Retrieve the X coordinate of the cursor's position.

This function never fails.

**Parameters:**

*cv* A handle to the libcaca canvas.

**Returns:**

The cursor's X coordinate.

Referenced by `caca_conio_cgets()`, `caca_conio_clreol()`, `caca_conio_cprintf()`, `caca_conio_cputs()`, `caca_conio_printf()`, `caca_conio_putch()`, and `caca_conio_wherex()`.

**12.3.3.3 `__extern int caca_wherey (caca_canvas_t const * cv)`**

Retrieve the Y coordinate of the cursor's position.

This function never fails.

**Parameters:**

*cv* A handle to the libcaca canvas.

**Returns:**

The cursor's Y coordinate.

Referenced by `caca_conio_cgets()`, `caca_conio_clreol()`, `caca_conio_cprintf()`, `caca_conio_cputs()`, `caca_conio_printf()`, `caca_conio_putch()`, and `caca_conio_wherey()`.

**12.3.3.4 `__extern int caca_put_char (caca_canvas_t * cv, int x, int y, uint32_t ch)`**

Print an ASCII or Unicode character at the given coordinates, using the default foreground and background colour values.

If the coordinates are outside the canvas boundaries, nothing is printed. If a fullwidth Unicode character gets overwritten, its remaining visible parts are replaced with spaces. If the canvas' boundaries would split the fullwidth character in two, a space is printed instead.

The behaviour when printing non-printable characters or invalid UTF-32 characters is undefined. To print a sequence of bytes forming an UTF-8 character instead of an UTF-32 character, use the [caca\\_put\\_str\(\)](#) function.

This function returns the width of the printed character. If it is a fullwidth character, 2 is returned. Otherwise, 1 is returned.

This function never fails.

**Parameters:**

- cv* A handle to the libcaca canvas.
- x* X coordinate.
- y* Y coordinate.
- ch* The character to print.

**Returns:**

The width of the printed character: 2 for a fullwidth character, 1 otherwise.

References [caca\\_add\\_dirty\\_rect\(\)](#), [CACA\\_MAGIC\\_FULLWIDTH](#), and [caca\\_utf32\\_is\\_fullwidth\(\)](#).

Referenced by [caca\\_conio\\_cgets\(\)](#), [caca\\_conio\\_cputs\(\)](#), [caca\\_conio\\_putch\(\)](#), [caca\\_dither\\_bitmap\(\)](#), [caca\\_fill\\_box\(\)](#), [caca\\_fill\\_triangle\(\)](#), [caca\\_flush\\_figlet\(\)](#), [caca\\_put\\_figchar\(\)](#), and [caca\\_put\\_str\(\)](#).

### 12.3.3.5 `__extern uint32_t caca_get_char (caca_canvas_t const * cv, int x, int y)`

Get the ASCII or Unicode value of the character at the given coordinates. If the value is less or equal to 127 (0x7f), the character can be printed as ASCII. Otherwise, it must be handled as a UTF-32 value.

If the coordinates are outside the canvas boundaries, a space (0x20) is returned.

A special exception is when [CACA\\_MAGIC\\_FULLWIDTH](#) is returned. This value is guaranteed not to be a valid Unicode character, and indicates that the character at the left of the requested one is a fullwidth character.

This function never fails.

**Parameters:**

- cv* A handle to the libcaca canvas.
- x* X coordinate.
- y* Y coordinate.

**Returns:**

The Unicode character at the given coordinates.

Referenced by [caca\\_flush\\_figlet\(\)](#), and [caca\\_put\\_figchar\(\)](#).

### 12.3.3.6 `__extern int caca_put_str (caca_canvas_t * cv, int x, int y, char const * s)`

Print an UTF-8 string at the given coordinates, using the default foreground and background values. The coordinates may be outside the canvas boundaries (eg. a negative Y coordinate) and the string will be cropped accordingly if it is too long.

See [caca\\_put\\_char\(\)](#) for more information on how fullwidth characters are handled when overwriting each other or at the canvas' boundaries.

This function returns the number of cells printed by the string. It is not the number of characters printed, because fullwidth characters account for two cells.

This function never fails.

#### Parameters:

- cv* A handle to the libcaca canvas.
- x* X coordinate.
- y* Y coordinate.
- s* The string to print.

#### Returns:

The number of cells printed.

References [caca\\_put\\_char\(\)](#), [caca\\_utf32\\_is\\_fullwidth\(\)](#), and [caca\\_utf8\\_to\\_utf32\(\)](#).

Referenced by [caca\\_vprintf\(\)](#).

### 12.3.3.7 `__extern int caca_printf (caca_canvas_t * cv, int x, int y, char const * format, ...)`

Format a string at the given coordinates, using the default foreground and background values. The coordinates may be outside the canvas boundaries (eg. a negative Y coordinate) and the string will be cropped accordingly if it is too long. The syntax of the format string is the same as for the C `printf()` function.

This function returns the number of cells printed by the string. It is not the number of characters printed, because fullwidth characters account for two cells.

This function never fails.

#### Parameters:

- cv* A handle to the libcaca canvas.
- x* X coordinate.
- y* Y coordinate.
- format* The format string to print.
- ...* Arguments to the format string.

#### Returns:

The number of cells printed.

References [caca\\_vprintf\(\)](#).

### 12.3.3.8 `__extern int caca_vprintf (caca_canvas_t * cv, int x, int y, char const *format, va_list args)`

Format a string at the given coordinates, using the default foreground and background values. The coordinates may be outside the canvas boundaries (eg. a negative Y coordinate) and the string will be cropped accordingly if it is too long. The syntax of the format string is the same as for the C `vprintf()` function.

This function returns the number of cells printed by the string. It is not the number of characters printed, because fullwidth characters account for two cells.

This function never fails.

#### Parameters:

*cv* A handle to the libcaca canvas.

*x* X coordinate.

*y* Y coordinate.

*format* The format string to print.

*args* A `va_list` containing the arguments to the format string.

#### Returns:

The number of cells printed.

References `caca_put_str()`.

Referenced by `caca_conio_cprintf()`, `caca_conio_printf()`, and `caca_printf()`.

### 12.3.3.9 `__extern int caca_clear_canvas (caca_canvas_t * cv)`

Clear the canvas using the current foreground and background colours.

This function never fails.

#### Parameters:

*cv* The canvas to clear.

#### Returns:

This function always returns 0.

References `caca_add_dirty_rect()`.

Referenced by `caca_conio_clrscr()`.

### 12.3.3.10 `__extern int caca_set_canvas_handle (caca_canvas_t * cv, int x, int y)`

Set the canvas' handle. Blitting functions will use the handle value to put the canvas at the proper coordinates.

This function never fails.

**Parameters:**

*cv* A handle to the libcaca canvas.

*x* X handle coordinate.

*y* Y handle coordinate.

**Returns:**

This function always returns 0.

Referenced by `caca_put_figchar()`.

**12.3.3.11** `__extern int caca_get_canvas_handle_x (caca_canvas_t const * cv)`

Retrieve the X coordinate of the canvas' handle.

This function never fails.

**Parameters:**

*cv* A handle to the libcaca canvas.

**Returns:**

The canvas' handle's X coordinate.

**12.3.3.12** `__extern int caca_get_canvas_handle_y (caca_canvas_t const * cv)`

Retrieve the Y coordinate of the canvas' handle.

This function never fails.

**Parameters:**

*cv* A handle to the libcaca canvas.

**Returns:**

The canvas' handle's Y coordinate.

**12.3.3.13** `__extern int caca_blit (caca_canvas_t * dst, int x, int y, caca_canvas_t const * src, caca_canvas_t const * mask)`

Blit a canvas onto another one at the given coordinates. An optional mask canvas can be used.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** A mask was specified but the mask size and source canvas size do not match.

**Parameters:**

*dst* The destination canvas.  
*x* X coordinate.  
*y* Y coordinate.  
*src* The source canvas.  
*mask* The mask canvas.

**Returns:**

0 in case of success, -1 if an error occurred.

References `caca_add_dirty_rect()`, and `CACA_MAGIC_FULLWIDTH`.

Referenced by `caca_conio_movetext()`, `caca_export_area_to_memory()`, `caca_import_area_from_file()`, `caca_import_area_from_memory()`, `caca_put_figchar()`, and `caca_set_canvas_boundaries()`.

**12.3.3.14 \_\_extern int caca\_set\_canvas\_boundaries (caca\_canvas\_t \* cv, int x, int y, int w, int h)**

Set new boundaries for a canvas. This function can be used to crop a canvas, to expand it or for combinations of both actions. All frames are affected by this function.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Specified width or height is invalid.
- **EBUSY** The canvas is in use by a display driver and cannot be resized.
- **ENOMEM** Not enough memory for the requested canvas size. If this happens, the canvas handle becomes invalid and should not be used.

**Parameters:**

*cv* The canvas to crop.  
*x* X coordinate of the top-left corner.  
*y* Y coordinate of the top-left corner.  
*w* The width of the cropped area.  
*h* The height of the cropped area.

**Returns:**

0 in case of success, -1 if an error occurred.

References `caca_add_dirty_rect()`, `caca_blit()`, `caca_create_canvas()`, `caca_create_frame()`, `caca_get_frame_count()`, and `caca_set_frame()`.

**12.4 libcaca dirty rectangle manipulation****Functions**

- \_\_extern int [caca\\_disable\\_dirty\\_rect](#) (caca\_canvas\_t \*)

*Disable dirty rectangles.*

- `__extern int caca\_enable\_dirty\_rect (caca\_canvas\_t *)`  
*Enable dirty rectangles.*
- `__extern int caca\_get\_dirty\_rect\_count (caca\_canvas\_t *)`  
*Get the number of dirty rectangles in the canvas.*
- `__extern int caca\_get\_dirty\_rect (caca\_canvas\_t *, int, int *, int *, int *, int *)`  
*Get a canvas's dirty rectangle.*
- `__extern int caca\_add\_dirty\_rect (caca\_canvas\_t *, int, int, int, int)`  
*Add an area to the canvas's dirty rectangle list.*
- `__extern int caca\_remove\_dirty\_rect (caca\_canvas\_t *, int, int, int, int)`  
*Remove an area from the dirty rectangle list.*
- `__extern int caca\_clear\_dirty\_rect\_list (caca\_canvas\_t *)`  
*Clear a canvas's dirty rectangle list.*

#### 12.4.1 Detailed Description

These functions manipulate dirty rectangles for optimised blitting.

#### 12.4.2 Function Documentation

##### 12.4.2.1 `__extern int caca\_disable\_dirty\_rect (caca\_canvas\_t * cv)`

Disable dirty rectangle handling for all *libcaca* graphic calls. This is handy when the calling application needs to do slow operations within a known area. Just call [caca\\_add\\_dirty\\_rect\(\)](#) afterwards.

This function is recursive. Dirty rectangles are only reenabled when [caca\\_enable\\_dirty\\_rect\(\)](#) is called as many times.

This function never fails.

#### Parameters:

*cv* A libcaca canvas.

#### Returns:

This function always returns 0.

##### 12.4.2.2 `__extern int caca\_enable\_dirty\_rect (caca\_canvas\_t * cv)`

This function can only be called after [caca\\_disable\\_dirty\\_rect\(\)](#) was called.

If an error occurs, -1 is returned and **errno** is set accordingly:



- `EINVAL` Dirty rectangles were not disabled.

**Parameters:**

*cv* A libcacaca canvas.

**Returns:**

0 in case of success, -1 if an error occurred.

**12.4.2.3 `__extern int caca_get_dirty_rect_count (caca_canvas_t * cv)`**

Get the number of dirty rectangles in a canvas. Dirty rectangles are areas that contain cells that have changed since the last reset.

The dirty rectangles are used internally by display drivers to optimise rendering by avoiding to redraw the whole screen. Once the display driver has rendered the canvas, it resets the dirty rectangle list.

Dirty rectangles are guaranteed not to overlap.

This function never fails.

**Parameters:**

*cv* A libcacaca canvas.

**Returns:**

The number of dirty rectangles in the given canvas.

**12.4.2.4 `__extern int caca_get_dirty_rect (caca_canvas_t * cv, int r, int * x, int * y, int * width, int * height)`**

Get the canvas's given dirty rectangle coordinates. The index must be within the dirty rectangle count. See [caca\\_get\\_dirty\\_rect\\_count\(\)](#) for how to compute this count.

If an error occurs, no coordinates are written in the pointer arguments, -1 is returned and **errno** is set accordingly:

- `EINVAL` Specified rectangle index is out of bounds.

**Parameters:**

*cv* A libcacaca canvas.

*r* The requested rectangle index.

*x* A pointer to an integer where the leftmost edge of the dirty rectangle will be stored.

*y* A pointer to an integer where the topmost edge of the dirty rectangle will be stored.

*width* A pointer to an integer where the width of the dirty rectangle will be stored.

*height* A pointer to an integer where the height of the dirty rectangle will be stored.

**Returns:**

0 in case of success, -1 if an error occurred.

**12.4.2.5** `__extern int caca_add_dirty_rect (caca_canvas_t * cv, int x, int y, int width, int height)`

Add an invalidating zone to the canvas's dirty rectangle list. For more information about the dirty rectangles, see [caca\\_get\\_dirty\\_rect\(\)](#).

This function may be useful to force refresh of a given zone of the canvas even if the dirty rectangle tracking indicates that it is unchanged. This may happen if the canvas contents were somewhat directly modified.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Specified rectangle coordinates are out of bounds.

**Parameters:**

**cv** A libcaca canvas.  
**x** The leftmost edge of the additional dirty rectangle.  
**y** The topmost edge of the additional dirty rectangle.  
**width** The width of the additional dirty rectangle.  
**height** The height of the additional dirty rectangle.

**Returns:**

0 in case of success, -1 if an error occurred.

Referenced by `caca_blit()`, `caca_clear_canvas()`, `caca_fill_box()`, `caca_flip()`, `caca_flop()`, `caca_free_frame()`, `caca_invert()`, `caca_put_attr()`, `caca_put_char()`, `caca_rotate_180()`, `caca_rotate_left()`, `caca_rotate_right()`, `caca_set_canvas_boundaries()`, `caca_set_frame()`, `caca_stretch_left()`, and `caca_stretch_right()`.

**12.4.2.6** `__extern int caca_remove_dirty_rect (caca_canvas_t * cv, int x, int y, int width, int height)`

Mark a cell area in the canvas as not dirty. For more information about the dirty rectangles, see [caca\\_get\\_dirty\\_rect\(\)](#).

Values such that **xmin** > **xmax** or **ymin** > **ymax** indicate that the dirty rectangle is empty. They will be silently ignored.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Specified rectangle coordinates are out of bounds.

**Parameters:**

**cv** A libcaca canvas.  
**x** The leftmost edge of the clean rectangle.  
**y** The topmost edge of the clean rectangle.  
**width** The width of the clean rectangle.  
**height** The height of the clean rectangle.

**Returns:**

0 in case of success, -1 if an error occurred.

#### 12.4.2.7 `__extern int caca_clear_dirty_rect_list (caca_canvas_t * cv)`

Empty the canvas's dirty rectangle list.

This function never fails.

**Parameters:**

*cv* A libcaca canvas.

**Returns:**

This function always returns 0.

Referenced by `caca_refresh_display()`.

## 12.5 libcaca canvas transformation

### Functions

- `__extern int caca_invert (caca_canvas_t *)`  
*Invert a canvas' colours.*
- `__extern int caca_flip (caca_canvas_t *)`  
*Flip a canvas horizontally.*
- `__extern int caca_flop (caca_canvas_t *)`  
*Flip a canvas vertically.*
- `__extern int caca_rotate_180 (caca_canvas_t *)`  
*Rotate a canvas.*
- `__extern int caca_rotate_left (caca_canvas_t *)`  
*Rotate a canvas, 90 degrees counterclockwise.*
- `__extern int caca_rotate_right (caca_canvas_t *)`  
*Rotate a canvas, 90 degrees counterclockwise.*
- `__extern int caca_stretch_left (caca_canvas_t *)`  
*Rotate and stretch a canvas, 90 degrees counterclockwise.*
- `__extern int caca_stretch_right (caca_canvas_t *)`  
*Rotate and stretch a canvas, 90 degrees clockwise.*

### 12.5.1 Detailed Description

These functions perform horizontal and vertical canvas flipping.

## 12.5.2 Function Documentation

### 12.5.2.1 `__extern int caca_invert (caca_canvas_t * cv)`

Invert a canvas' colours (black becomes white, red becomes cyan, etc.) without changing the characters in it.

This function never fails.

#### Parameters:

*cv* The canvas to invert.

#### Returns:

This function always returns 0.

References `caca_add_dirty_rect()`.

### 12.5.2.2 `__extern int caca_flip (caca_canvas_t * cv)`

Flip a canvas horizontally, choosing characters that look like the mirrored version wherever possible. Some characters will stay unchanged by the process, but the operation is guaranteed to be involutive: performing it again gives back the original canvas.

This function never fails.

#### Parameters:

*cv* The canvas to flip.

#### Returns:

This function always returns 0.

References `caca_add_dirty_rect()`, and `CACA_MAGIC_FULLWIDTH`.

### 12.5.2.3 `__extern int caca_flop (caca_canvas_t * cv)`

Flip a canvas vertically, choosing characters that look like the mirrored version wherever possible. Some characters will stay unchanged by the process, but the operation is guaranteed to be involutive: performing it again gives back the original canvas.

This function never fails.

#### Parameters:

*cv* The canvas to flop.

#### Returns:

This function always returns 0.

References `caca_add_dirty_rect()`.

#### 12.5.2.4 `__extern int caca_rotate_180 (caca_canvas_t * cv)`

Apply a 180-degree transformation to a canvas, choosing characters that look like the upside-down version wherever possible. Some characters will stay unchanged by the process, but the operation is guaranteed to be involutive: performing it again gives back the original canvas.

This function never fails.

##### Parameters:

*cv* The canvas to rotate.

##### Returns:

This function always returns 0.

References `caca_add_dirty_rect()`, and `CACA_MAGIC_FULLWIDTH`.

#### 12.5.2.5 `__extern int caca_rotate_left (caca_canvas_t * cv)`

Apply a 90-degree transformation to a canvas, choosing characters that look like the rotated version wherever possible. Characters cells are rotated two-by-two. Some characters will stay unchanged by the process, some others will be replaced by close equivalents. Fullwidth characters at odd horizontal coordinates will be lost. The operation is not guaranteed to be reversible at all.

Note that the width of the canvas is divided by two and becomes the new height. Height is multiplied by two and becomes the new width. If the original width is an odd number, the division is rounded up.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EBUSY** The canvas is in use by a display driver and cannot be rotated.
- **ENOMEM** Not enough memory to allocate the new canvas size. If this happens, the previous canvas handle is still valid.

##### Parameters:

*cv* The canvas to rotate left.

##### Returns:

0 in case of success, -1 if an error occurred.

References `caca_add_dirty_rect()`.

#### 12.5.2.6 `__extern int caca_rotate_right (caca_canvas_t * cv)`

Apply a 90-degree transformation to a canvas, choosing characters that look like the rotated version wherever possible. Characters cells are rotated two-by-two. Some characters will stay unchanged by the process, some others will be replaced by close equivalents. Fullwidth characters at odd horizontal coordinates will be lost. The operation is not guaranteed to be reversible at all.

Note that the width of the canvas is divided by two and becomes the new height. Height is multiplied by two and becomes the new width. If the original width is an odd number, the division is rounded up.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EBUSY** The canvas is in use by a display driver and cannot be rotated.
- **ENOMEM** Not enough memory to allocate the new canvas size. If this happens, the previous canvas handle is still valid.

**Parameters:**

*cv* The canvas to rotate right.

**Returns:**

0 in case of success, -1 if an error occurred.

References `caca_add_dirty_rect()`.

#### 12.5.2.7 `__extern int caca_stretch_left (caca_canvas_t * cv)`

Apply a 90-degree transformation to a canvas, choosing characters that look like the rotated version wherever possible. Some characters will stay unchanged by the process, some others will be replaced by close equivalents. Fullwidth characters will be lost. The operation is not guaranteed to be reversible at all.

Note that the width and height of the canvas are swapped, causing its aspect ratio to look stretched.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EBUSY** The canvas is in use by a display driver and cannot be rotated.
- **ENOMEM** Not enough memory to allocate the new canvas size. If this happens, the previous canvas handle is still valid.

**Parameters:**

*cv* The canvas to rotate left.

**Returns:**

0 in case of success, -1 if an error occurred.

References `caca_add_dirty_rect()`.

#### 12.5.2.8 `__extern int caca_stretch_right (caca_canvas_t * cv)`

Apply a 270-degree transformation to a canvas, choosing characters that look like the rotated version wherever possible. Some characters will stay unchanged by the process, some others will be replaced by close equivalents. Fullwidth characters will be lost. The operation is not guaranteed to be reversible at all.

Note that the width and height of the canvas are swapped, causing its aspect ratio to look stretched.

If an error occurs, -1 is returned and **errno** is set accordingly:

- `EBUSY` The canvas is in use by a display driver and cannot be rotated.
- `ENOMEM` Not enough memory to allocate the new canvas size. If this happens, the previous canvas handle is still valid.

**Parameters:**

`cv` The canvas to rotate right.

**Returns:**

0 in case of success, -1 if an error occurred.

References `caca_add_dirty_rect()`.

## 12.6 libcaca attribute conversions

**Functions**

- `__extern uint32_t caca_get_attr (caca_canvas_t const *, int, int)`  
*Get the text attribute at the given coordinates.*
- `__extern int caca_set_attr (caca_canvas_t *, uint32_t)`  
*Set the default character attribute.*
- `__extern int caca_unset_attr (caca_canvas_t *, uint32_t)`  
*Unset flags in the default character attribute.*
- `__extern int caca_toggle_attr (caca_canvas_t *, uint32_t)`  
*Toggle flags in the default character attribute.*
- `__extern int caca_put_attr (caca_canvas_t *, int, int, uint32_t)`  
*Set the character attribute at the given coordinates.*
- `__extern int caca_set_color_ansi (caca_canvas_t *, uint8_t, uint8_t)`  
*Set the default colour pair for text (ANSI version).*
- `__extern int caca_set_color_argb (caca_canvas_t *, uint16_t, uint16_t)`  
*Set the default colour pair for text (truecolor version).*
- `__extern uint8_t caca_attr_to_ansi (uint32_t)`  
*Get DOS ANSI information from attribute.*
- `__extern uint8_t caca_attr_to_ansi_fg (uint32_t)`  
*Get ANSI foreground information from attribute.*
- `__extern uint8_t caca_attr_to_ansi_bg (uint32_t)`  
*Get ANSI background information from attribute.*
- `__extern uint16_t caca_attr_to_rgb12_fg (uint32_t)`  
*Get 12-bit RGB foreground information from attribute.*

- `__extern uint16_t caca_attr_to_rgb12_bg (uint32_t)`  
*Get 12-bit RGB background information from attribute.*
- `__extern void caca_attr_to_argb64 (uint32_t, uint8_t[8])`  
*Get 64-bit ARGB information from attribute.*

### 12.6.1 Detailed Description

These functions perform conversions between attribute values.

### 12.6.2 Function Documentation

#### 12.6.2.1 `__extern uint32_t caca_get_attr (caca_canvas_t const * cv, int x, int y)`

Get the internal *libcaca* attribute value of the character at the given coordinates. The attribute value has 32 significant bits, organised as follows from MSB to LSB:

- 3 bits for the background alpha
- 4 bits for the background red component
- 4 bits for the background green component
- 3 bits for the background blue component
- 3 bits for the foreground alpha
- 4 bits for the foreground red component
- 4 bits for the foreground green component
- 3 bits for the foreground blue component
- 4 bits for the bold, italics, underline and blink flags

If the coordinates are outside the canvas boundaries, the current attribute is returned.

This function never fails.

#### Parameters:

- cv* A handle to the libcaca canvas.
- x* X coordinate.
- y* Y coordinate.

#### Returns:

The requested attribute.

Referenced by `caca_conio_textbackground()`, `caca_conio_textcolor()`, `caca_dither_bitmap()`, `caca_flush_figlet()`, and `caca_put_figchar()`.



### 12.6.2.2 `__extern int caca_set_attr (caca_canvas_t * cv, uint32_t attr)`

Set the default character attribute for drawing. Attributes define foreground and background colour, transparency, bold, italics and underline styles, as well as blink. String functions such as [caca\\_printf\(\)](#) and graphical primitive functions such as [caca\\_draw\\_line\(\)](#) will use this attribute.

The value of *attr* is either:

- a 32-bit integer as returned by [caca\\_get\\_attr\(\)](#), in which case it also contains colour information,
- a combination (bitwise OR) of style values (*CACA\_UNDERLINE*, *CACA\_BLINK*, *CACA\_BOLD* and *CACA\_ITALICS*), in which case setting the attribute does not modify the current colour information.

To retrieve the current attribute value, use `caca_get_attr(-1,-1)`.

This function never fails.

#### Parameters:

*cv* A handle to the libcaca canvas.

*attr* The requested attribute value.

#### Returns:

This function always returns 0.

Referenced by `caca_dither_bitmap()`, and `caca_put_figchar()`.

### 12.6.2.3 `__extern int caca_unset_attr (caca_canvas_t * cv, uint32_t attr)`

Unset flags in the default character attribute for drawing. Attributes define foreground and background colour, transparency, bold, italics and underline styles, as well as blink. String functions such as [caca\\_printf\(\)](#) and graphical primitive functions such as [caca\\_draw\\_line\(\)](#) will use this attribute.

The value of *attr* is a combination (bitwise OR) of style values (*CACA\_UNDERLINE*, *CACA\_BLINK*, *CACA\_BOLD* and *CACA\_ITALICS*). Unsetting these attributes does not modify the current colour information.

To retrieve the current attribute value, use `caca_get_attr(-1,-1)`.

This function never fails.

#### Parameters:

*cv* A handle to the libcaca canvas.

*attr* The requested attribute values to unset.

#### Returns:

This function always returns 0.

#### 12.6.2.4 `__extern int caca_toggle_attr (caca_canvas_t * cv, uint32_t attr)`

Toggle flags in the default character attribute for drawing. Attributes define foreground and background colour, transparency, bold, italics and underline styles, as well as blink. String functions such as [caca\\_printf\(\)](#) and graphical primitive functions such as [caca\\_draw\\_line\(\)](#) will use this attribute.

The value of *attr* is a combination (bitwise OR) of style values (*CACA\_UNDERLINE*, *CACA\_BLINK*, *CACA\_BOLD* and *CACA\_ITALICS*). Toggling these attributes does not modify the current colour information.

To retrieve the current attribute value, use `caca_get_attr(-1,-1)`.

This function never fails.

##### Parameters:

- cv* A handle to the libcaca canvas.
- attr* The requested attribute values to toggle.

##### Returns:

This function always returns 0.

#### 12.6.2.5 `__extern int caca_put_attr (caca_canvas_t * cv, int x, int y, uint32_t attr)`

Set the character attribute, without changing the character's value. If the character at the given coordinates is a fullwidth character, both cells' attributes are replaced.

The value of *attr* is either:

- a 32-bit integer as returned by [caca\\_get\\_attr\(\)](#), in which case it also contains colour information,
- a combination (bitwise OR) of style values (*CACA\_UNDERLINE*, *CACA\_BLINK*, *CACA\_BOLD* and *CACA\_ITALICS*), in which case setting the attribute does not modify the current colour information.

This function never fails.

##### Parameters:

- cv* A handle to the libcaca canvas.
- x* X coordinate.
- y* Y coordinate.
- attr* The requested attribute value.

##### Returns:

This function always returns 0.

References [caca\\_add\\_dirty\\_rect\(\)](#), and *CACA\_MAGIC\_FULLWIDTH*.

Referenced by [caca\\_flush\\_figlet\(\)](#), and [caca\\_put\\_figchar\(\)](#).

### 12.6.2.6 `__extern int caca_set_color_ansi (caca_canvas_t * cv, uint8_t fg, uint8_t bg)`

Set the default ANSI colour pair for text drawing. String functions such as `caca_printf()` and graphical primitive functions such as `caca_draw_line()` will use these attributes.

Color values are those defined in `caca.h`, such as `CACA_RED` or `CACA_TRANSPARENT`.

If an error occurs, 0 is returned and `errno` is set accordingly:

- `EINVAL` At least one of the colour values is invalid.

#### Parameters:

*cv* A handle to the libcaca canvas.

*fg* The requested ANSI foreground colour.

*bg* The requested ANSI background colour.

#### Returns:

0 in case of success, -1 if an error occurred.

Referenced by `caca_conio_textbackground()`, `caca_conio_textcolor()`, `caca_create_canvas()`, and `caca_dither_bitmap()`.

### 12.6.2.7 `__extern int caca_set_color_argb (caca_canvas_t * cv, uint16_t fg, uint16_t bg)`

Set the default ARGB colour pair for text drawing. String functions such as `caca_printf()` and graphical primitive functions such as `caca_draw_line()` will use these attributes.

Colors are 16-bit ARGB values, each component being coded on 4 bits. For instance, `0xf088` is solid dark cyan (A=15 R=0 G=8 B=8), and `0x8fff` is white with 50% alpha (A=8 R=15 G=15 B=15).

This function never fails.

#### Parameters:

*cv* A handle to the libcaca canvas.

*fg* The requested ARGB foreground colour.

*bg* The requested ARGB background colour.

#### Returns:

This function always returns 0.

### 12.6.2.8 `__extern uint8_t caca_attr_to_ansi (uint32_t attr)`

Get the ANSI colour pair for a given attribute. The returned value is an 8-bit value whose higher 4 bits are the background colour and lower 4 bits are the foreground colour.

If the attribute has ARGB colours, the nearest colour is used. Special attributes such as *CACA\_DEFAULT* and *CACA\_TRANSPARENT* are not handled and are both replaced with *CACA\_LIGHTGRAY* for the foreground colour and *CACA\_BLACK* for the background colour.

This function never fails. If the attribute value is outside the expected 32-bit range, higher order bits are simply ignored.

**Parameters:**

*attr* The requested attribute value.

**Returns:**

The corresponding DOS ANSI value.

References *CACA\_BLACK*, and *CACA\_LIGHTGRAY*.

**12.6.2.9 \_\_extern uint8\_t caca\_attr\_to\_ansi\_fg (uint32\_t attr)**

Get the ANSI foreground colour value for a given attribute. The returned value is either one of the *CACA\_RED*, *CACA\_BLACK* etc. predefined colours, or the special value *CACA\_DEFAULT* meaning the media's default foreground value, or the special value *CACA\_TRANSPARENT*.

If the attribute has ARGB colours, the nearest colour is returned.

This function never fails. If the attribute value is outside the expected 32-bit range, higher order bits are simply ignored.

**Parameters:**

*attr* The requested attribute value.

**Returns:**

The corresponding ANSI foreground value.

Referenced by *caca\_conio\_textbackground()*.

**12.6.2.10 \_\_extern uint8\_t caca\_attr\_to\_ansi\_bg (uint32\_t attr)**

Get the ANSI background colour value for a given attribute. The returned value is either one of the *CACA\_RED*, *CACA\_BLACK* etc. predefined colours, or the special value *CACA\_DEFAULT* meaning the media's default background value, or the special value *CACA\_TRANSPARENT*.

If the attribute has ARGB colours, the nearest colour is returned.

This function never fails. If the attribute value is outside the expected 32-bit range, higher order bits are simply ignored.

**Parameters:**

*attr* The requested attribute value.

**Returns:**

The corresponding ANSI background value.

Referenced by `caca_conio_textcolor()`.

**12.6.2.11 `__extern uint16_t caca_attr_to_rgb12_fg (uint32_t attr)`**

Get the 12-bit foreground colour value for a given attribute. The returned value is a native-endian encoded integer with each red, green and blue values encoded on 8 bits in the following order:

- 8-11 most significant bits: red
- 4-7 most significant bits: green
- least significant bits: blue

This function never fails. If the attribute value is outside the expected 32-bit range, higher order bits are simply ignored.

**Parameters:**

*attr* The requested attribute value.

**Returns:**

The corresponding 12-bit RGB foreground value.

References `CACA_DEFAULT`, `CACA_LIGHTGRAY`, and `CACA_TRANSPARENT`.

**12.6.2.12 `__extern uint16_t caca_attr_to_rgb12_bg (uint32_t attr)`**

Get the 12-bit background colour value for a given attribute. The returned value is a native-endian encoded integer with each red, green and blue values encoded on 8 bits in the following order:

- 8-11 most significant bits: red
- 4-7 most significant bits: green
- least significant bits: blue

This function never fails. If the attribute value is outside the expected 32-bit range, higher order bits are simply ignored.

**Parameters:**

*attr* The requested attribute value.

**Returns:**

The corresponding 12-bit RGB background value.

References `CACA_BLACK`, `CACA_DEFAULT`, and `CACA_TRANSPARENT`.

### 12.6.2.13 `__extern void caca_attr_to_argb64 (uint32_t attr, uint8_t argb[8])`

Get the 64-bit colour and alpha values for a given attribute. The values are written as 8-bit integers in the *argb* array in the following order:

- *argb*[0]: background alpha value
- *argb*[1]: background red value
- *argb*[2]: background green value
- *argb*[3]: background blue value
- *argb*[4]: foreground alpha value
- *argb*[5]: foreground red value
- *argb*[6]: foreground green value
- *argb*[7]: foreground blue value

This function never fails. If the attribute value is outside the expected 32-bit range, higher order bits are simply ignored.

#### Parameters:

*attr* The requested attribute value.

*argb* An array of 8-bit integers.

References CACA\_BLACK, CACA\_DEFAULT, CACA\_LIGHTGRAY, and CACA\_TRANSPARENT.

Referenced by `caca_render_canvas()`.

## 12.7 libcaca character set conversions

### Functions

- `__extern uint32_t caca_utf8_to_utf32 (char const *, size_t *)`  
*Convert a UTF-8 character to UTF-32.*
- `__extern size_t caca_utf32_to_utf8 (char *, uint32_t)`  
*Convert a UTF-32 character to UTF-8.*
- `__extern uint8_t caca_utf32_to_cp437 (uint32_t)`  
*Convert a UTF-32 character to CP437.*
- `__extern uint32_t caca_cp437_to_utf32 (uint8_t)`  
*Convert a CP437 character to UTF-32.*
- `__extern char caca_utf32_to_ascii (uint32_t)`  
*Convert a UTF-32 character to ASCII.*
- `__extern int caca_utf32_is_fullwidth (uint32_t)`  
*Tell whether a UTF-32 character is fullwidth.*

### 12.7.1 Detailed Description

These functions perform conversions between usual character sets.

### 12.7.2 Function Documentation

#### 12.7.2.1 `__extern uint32_t caca_utf8_to_utf32(char const *s, size_t *bytes)`

Convert a UTF-8 character read from a string and return its value in the UTF-32 character set. If the second argument is not null, the total number of read bytes is written in it.

If a null byte was reached before the expected end of the UTF-8 sequence, this function returns zero and the number of read bytes is set to zero.

This function never fails, but its behaviour with illegal UTF-8 sequences is undefined.

##### Parameters:

*s* A string containing the UTF-8 character.

*bytes* A pointer to a `size_t` to store the number of bytes in the character, or NULL.

##### Returns:

The corresponding UTF-32 character, or zero if the character is incomplete.

Referenced by `caca_put_str()`.

#### 12.7.2.2 `__extern size_t caca_utf32_to_utf8(char *buf, uint32_t ch)`

Convert a UTF-32 character read from a string and write its value in the UTF-8 character set into the given buffer.

This function never fails, but its behaviour with illegal UTF-32 characters is undefined.

##### Parameters:

*buf* A pointer to a character buffer where the UTF-8 sequence will be written.

*ch* The UTF-32 character.

##### Returns:

The number of bytes written.

#### 12.7.2.3 `__extern uint8_t caca_utf32_to_cp437(uint32_t ch)`

Convert a UTF-32 character read from a string and return its value in the CP437 character set, or "?" if the character has no equivalent.

This function never fails.

**Parameters:**

*ch* The UTF-32 character.

**Returns:**

The corresponding CP437 character, or "?" if not representable.

**12.7.2.4 \_\_extern uint32\_t caca\_cp437\_to\_utf32 (uint8\_t *ch*)**

Convert a CP437 character read from a string and return its value in the UTF-32 character set, or zero if the character is a CP437 control character.

This function never fails.

**Parameters:**

*ch* The CP437 character.

**Returns:**

The corresponding UTF-32 character, or zero if not representable.

**12.7.2.5 \_\_extern char caca\_utf32\_to\_ascii (uint32\_t *ch*)**

Convert a UTF-32 character into an ASCII character. When no equivalent exists, a graphically close equivalent is sought.

This function never fails, but its behaviour with illegal UTF-32 characters is undefined.

**Parameters:**

*ch* The UTF-32 character.

**Returns:**

The corresponding ASCII character, or a graphically close equivalent if found, or "?" if not representable.

**12.7.2.6 \_\_extern int caca\_utf32\_is\_fullwidth (uint32\_t *ch*)**

Check whether the given UTF-32 character should be printed at twice the normal width (fullwidth characters). If the character is unknown or if its status cannot be decided, it is treated as a standard-width character.

This function never fails.

**Parameters:**

*ch* The UTF-32 character.



**Returns:**

1 if the character is fullwidth, 0 otherwise.

Referenced by `caca_put_char()`, and `caca_put_str()`.

**12.8 libcaca primitives drawing****Functions**

- `__extern int caca_draw_line (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Draw a line on the canvas using the given character.*
- `__extern int caca_draw_polyline (caca_canvas_t *, int const x[], int const y[], int, uint32_t)`  
*Draw a polyline.*
- `__extern int caca_draw_thin_line (caca_canvas_t *, int, int, int, int)`  
*Draw a thin line on the canvas, using ASCII art.*
- `__extern int caca_draw_thin_polyline (caca_canvas_t *, int const x[], int const y[], int)`  
*Draw an ASCII art thin polyline.*
- `__extern int caca_draw_circle (caca_canvas_t *, int, int, int, uint32_t)`  
*Draw a circle on the canvas using the given character.*
- `__extern int caca_draw_ellipse (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Draw an ellipse on the canvas using the given character.*
- `__extern int caca_draw_thin_ellipse (caca_canvas_t *, int, int, int, int)`  
*Draw a thin ellipse on the canvas.*
- `__extern int caca_fill_ellipse (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Fill an ellipse on the canvas using the given character.*
- `__extern int caca_draw_box (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Draw a box on the canvas using the given character.*
- `__extern int caca_draw_thin_box (caca_canvas_t *, int, int, int, int)`  
*Draw a thin box on the canvas.*
- `__extern int caca_draw_cp437_box (caca_canvas_t *, int, int, int, int)`  
*Draw a box on the canvas using CP437 characters.*
- `__extern int caca_fill_box (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Fill a box on the canvas using the given character.*
- `__extern int caca_draw_triangle (caca_canvas_t *, int, int, int, int, int, int, uint32_t)`  
*Draw a triangle on the canvas using the given character.*
- `__extern int caca_draw_thin_triangle (caca_canvas_t *, int, int, int, int, int, int)`

*Draw a thin triangle on the canvas.*

- `__extern int caca_fill_triangle (caca_canvas_t *, int, int, int, int, int, int, uint32_t)`

*Fill a triangle on the canvas using the given character.*

- `__extern int caca_fill_triangle_textured (caca_canvas_t *cv, int coords[6], caca_canvas_t *tex, float uv[6])`

*Fill a triangle on the canvas using an arbitrary-sized texture.*

### 12.8.1 Detailed Description

These functions provide routines for primitive drawing, such as lines, boxes, triangles and ellipses.

### 12.8.2 Function Documentation

#### 12.8.2.1 `__extern int caca_draw_line (caca_canvas_t * cv, int x1, int y1, int x2, int y2, uint32_t ch)`

This function never fails.

##### Parameters:

- cv* The handle to the libcaca canvas.
- x1* X coordinate of the first point.
- y1* Y coordinate of the first point.
- x2* X coordinate of the second point.
- y2* Y coordinate of the second point.
- ch* UTF-32 character to be used to draw the line.

##### Returns:

This function always returns 0.

Referenced by `caca_draw_box()`, `caca_draw_triangle()`, and `caca_fill_ellipse()`.

#### 12.8.2.2 `__extern int caca_draw_polyline (caca_canvas_t * cv, int const x[ ], int const y[ ], int n, uint32_t ch)`

Draw a polyline on the canvas using the given character and coordinate arrays. The first and last points are not connected, hence in order to draw a polygon you need to specify the starting point at the end of the list as well.

This function never fails.

##### Parameters:

- cv* The handle to the libcaca canvas.

*x* Array of X coordinates. Must have  $n + 1$  elements.  
*y* Array of Y coordinates. Must have  $n + 1$  elements.  
*n* Number of lines to draw.  
*ch* UTF-32 character to be used to draw the lines.

**Returns:**

This function always returns 0.

**12.8.2.3 `__extern int caca_draw_thin_line (caca_canvas_t * cv, int x1, int y1, int x2, int y2)`**

This function never fails.

**Parameters:**

*cv* The handle to the libcaca canvas.  
*x1* X coordinate of the first point.  
*y1* Y coordinate of the first point.  
*x2* X coordinate of the second point.  
*y2* Y coordinate of the second point.

**Returns:**

This function always returns 0.

Referenced by `caca_draw_thin_triangle()`.

**12.8.2.4 `__extern int caca_draw_thin_polyline (caca_canvas_t * cv, int const x[], int const y[], int n)`**

Draw a thin polyline on the canvas using the given coordinate arrays and with ASCII art. The first and last points are not connected, so in order to draw a polygon you need to specify the starting point at the end of the list as well.

This function never fails.

**Parameters:**

*cv* The handle to the libcaca canvas.  
*x* Array of X coordinates. Must have  $n + 1$  elements.  
*y* Array of Y coordinates. Must have  $n + 1$  elements.  
*n* Number of lines to draw.

**Returns:**

This function always returns 0.

**12.8.2.5** `__extern int caca_draw_circle (caca_canvas_t * cv, int x, int y, int r, uint32_t ch)`

This function never fails.

**Parameters:**

- cv* The handle to the libcaca canvas.
- x* Center X coordinate.
- y* Center Y coordinate.
- r* Circle radius.
- ch* UTF-32 character to be used to draw the circle outline.

**Returns:**

This function always returns 0.

**12.8.2.6** `__extern int caca_draw_ellipse (caca_canvas_t * cv, int xo, int yo, int a, int b, uint32_t ch)`

This function never fails.

**Parameters:**

- cv* The handle to the libcaca canvas.
- xo* Center X coordinate.
- yo* Center Y coordinate.
- a* Ellipse X radius.
- b* Ellipse Y radius.
- ch* UTF-32 character to be used to draw the ellipse outline.

**Returns:**

This function always returns 0.

**12.8.2.7** `__extern int caca_draw_thin_ellipse (caca_canvas_t * cv, int xo, int yo, int a, int b)`

This function never fails.

**Parameters:**

- cv* The handle to the libcaca canvas.
- xo* Center X coordinate.
- yo* Center Y coordinate.
- a* Ellipse X radius.
- b* Ellipse Y radius.

**Returns:**

This function always returns 0.

**12.8.2.8** `__extern int caca_fill_ellipse (caca_canvas_t * cv, int xo, int yo, int a, int b, uint32_t ch)`

This function never fails.

**Parameters:**

- cv* The handle to the libcaca canvas.
- xo* Center X coordinate.
- yo* Center Y coordinate.
- a* Ellipse X radius.
- b* Ellipse Y radius.
- ch* UTF-32 character to be used to fill the ellipse.

**Returns:**

This function always returns 0.

References `caca_draw_line()`.

**12.8.2.9** `__extern int caca_draw_box (caca_canvas_t * cv, int x, int y, int w, int h, uint32_t ch)`

This function never fails.

**Parameters:**

- cv* The handle to the libcaca canvas.
- x* X coordinate of the upper-left corner of the box.
- y* Y coordinate of the upper-left corner of the box.
- w* Width of the box.
- h* Height of the box.
- ch* UTF-32 character to be used to draw the box.

**Returns:**

This function always returns 0.

References `caca_draw_line()`.

**12.8.2.10** `__extern int caca_draw_thin_box (caca_canvas_t * cv, int x, int y, int w, int h)`

This function never fails.

**Parameters:**

- cv* The handle to the libcaca canvas.
- x* X coordinate of the upper-left corner of the box.

*y* Y coordinate of the upper-left corner of the box.  
*w* Width of the box.  
*h* Height of the box.

**Returns:**

This function always returns 0.

**12.8.2.11** `__extern int caca_draw_cp437_box (caca_canvas_t * cv, int x, int y, int w, int h)`

This function never fails.

**Parameters:**

*cv* The handle to the libcaca canvas.  
*x* X coordinate of the upper-left corner of the box.  
*y* Y coordinate of the upper-left corner of the box.  
*w* Width of the box.  
*h* Height of the box.

**Returns:**

This function always returns 0.

**12.8.2.12** `__extern int caca_fill_box (caca_canvas_t * cv, int x, int y, int w, int h, uint32_t ch)`

This function never fails.

**Parameters:**

*cv* The handle to the libcaca canvas.  
*x* X coordinate of the upper-left corner of the box.  
*y* Y coordinate of the upper-left corner of the box.  
*w* Width of the box.  
*h* Height of the box.  
*ch* UTF-32 character to be used to draw the box.

**Returns:**

This function always returns 0.

References `caca_add_dirty_rect()`, and `caca_put_char()`.

Referenced by `caca_conio_clreol()`.

**12.8.2.13** `__extern int caca_draw_triangle (caca_canvas_t * cv, int x1, int y1, int x2, int y2, int x3, int y3, uint32_t ch)`

This function never fails.

**Parameters:**

- cv* The handle to the libcaca canvas.
- x1* X coordinate of the first point.
- y1* Y coordinate of the first point.
- x2* X coordinate of the second point.
- y2* Y coordinate of the second point.
- x3* X coordinate of the third point.
- y3* Y coordinate of the third point.
- ch* UTF-32 character to be used to draw the triangle outline.

**Returns:**

This function always returns 0.

References `caca_draw_line()`.

**12.8.2.14** `__extern int caca_draw_thin_triangle (caca_canvas_t * cv, int x1, int y1, int x2, int y2, int x3, int y3)`

This function never fails.

**Parameters:**

- cv* The handle to the libcaca canvas.
- x1* X coordinate of the first point.
- y1* Y coordinate of the first point.
- x2* X coordinate of the second point.
- y2* Y coordinate of the second point.
- x3* X coordinate of the third point.
- y3* Y coordinate of the third point.

**Returns:**

This function always returns 0.

References `caca_draw_thin_line()`.

**12.8.2.15** `__extern int caca_fill_triangle (caca_canvas_t * cv, int x1, int y1, int x2, int y2, int x3, int y3, uint32_t ch)`

This function never fails.

**Parameters:**

*cv* The handle to the libcaca canvas.  
*x1* X coordinate of the first point.  
*y1* Y coordinate of the first point.  
*x2* X coordinate of the second point.  
*y2* Y coordinate of the second point.  
*x3* X coordinate of the third point.  
*y3* Y coordinate of the third point.  
*ch* UTF-32 character to be used to fill the triangle.

**Returns:**

This function always returns 0.

References `caca_fill_triangle()`, and `caca_put_char()`.

Referenced by `caca_fill_triangle()`.

**12.8.2.16** `__extern int caca_fill_triangle_textured (caca_canvas_t * cv, int coords[6], caca_canvas_t * tex, float uv[6])`

This function fails if one or both the canvas are missing

**Parameters:**

*cv* The handle to the libcaca canvas.  
*coords* The coordinates of the triangle (3{x,y})  
*tex* The handle of the canvas texture.  
*uv* The coordinates of the texture (3{u,v})

**Returns:**

This function return 0 if ok, -1 if canvas or texture are missing.

## 12.9 libcaca canvas frame handling

### Functions

- `__extern int caca_get_frame_count (caca_canvas_t const *)`  
*Get the number of frames in a canvas.*
- `__extern int caca_set_frame (caca_canvas_t *, int)`



*Activate a given canvas frame.*

- `__extern char const * caca\_get\_frame\_name (caca\_canvas\_t const *)`  
*Get the current frame's name.*
- `__extern int caca\_set\_frame\_name (caca\_canvas\_t *, char const *)`  
*Set the current frame's name.*
- `__extern int caca\_create\_frame (caca\_canvas\_t *, int)`  
*Add a frame to a canvas.*
- `__extern int caca\_free\_frame (caca\_canvas\_t *, int)`  
*Remove a frame from a canvas.*

### 12.9.1 Detailed Description

These functions provide high level routines for canvas frame insertion, removal, copying etc.

### 12.9.2 Function Documentation

#### 12.9.2.1 `__extern int caca\_get\_frame\_count (caca\_canvas\_t const * cv)`

Return the current canvas' frame count.

This function never fails.

#### Parameters:

*cv* A libcaca canvas

#### Returns:

The frame count

Referenced by `caca\_set\_canvas\_boundaries()`.

#### 12.9.2.2 `__extern int caca\_set\_frame (caca\_canvas\_t * cv, int id)`

Set the active canvas frame. All subsequent drawing operations will be performed on that frame. The current painting context set by `caca\_set\_attr()` is inherited.

If the frame index is outside the canvas' frame range, nothing happens.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Requested frame is out of range.

#### Parameters:

*cv* A libcaca canvas

*id* The canvas frame to activate

**Returns:**

0 in case of success, -1 if an error occurred.

References `caca_add_dirty_rect()`.

Referenced by `caca_set_canvas_boundaries()`.

**12.9.2.3 `__extern char const* caca_get_frame_name (caca_canvas_t const * cv)`**

Return the current frame's name. The returned string is valid until the frame is deleted or `caca_set_frame_name()` is called to change the frame name again.

This function never fails.

**Parameters:**

*cv* A libcaca canvas.

**Returns:**

The current frame's name.

**12.9.2.4 `__extern int caca_set_frame_name (caca_canvas_t * cv, char const * name)`**

Set the current frame's name. Upon creation, a frame has a default name of "frame#xxxxxxx" where xxxxxxx is a self-incrementing hexadecimal number.

If an error occurs, -1 is returned and **errno** is set accordingly:

- ENOMEM Not enough memory to allocate new frame.

**Parameters:**

*cv* A libcaca canvas.

*name* The name to give to the current frame.

**Returns:**

0 in case of success, -1 if an error occurred.

**12.9.2.5 `__extern int caca_create_frame (caca_canvas_t * cv, int id)`**

Create a new frame within the given canvas. Its contents and attributes are copied from the currently active frame.

The frame index indicates where the frame should be inserted. Valid values range from 0 to the current canvas frame count. If the frame index is greater than or equals the current canvas frame count, the new

frame is appended at the end of the canvas. If the frame index is less than zero, the new frame is inserted at index 0.

The active frame does not change, but its index may be renumbered due to the insertion.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **ENOMEM** Not enough memory to allocate new frame.

#### Parameters:

*cv* A libcaca canvas

*id* The index where to insert the new frame

#### Returns:

0 in case of success, -1 if an error occurred.

Referenced by `caca_set_canvas_boundaries()`.

#### 12.9.2.6 `__extern int caca_free_frame (caca_canvas_t * cv, int id)`

Delete a frame from a given canvas.

The frame index indicates the frame to delete. Valid values range from 0 to the current canvas frame count minus 1. If the frame index is greater than or equals the current canvas frame count, the last frame is deleted.

If the active frame is deleted, frame 0 becomes the new active frame. Otherwise, the active frame does not change, but its index may be renumbered due to the deletion.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Requested frame is out of range, or attempt to delete the last frame of the canvas.

#### Parameters:

*cv* A libcaca canvas

*id* The index of the frame to delete

#### Returns:

0 in case of success, -1 if an error occurred.

References `caca_add_dirty_rect()`.

## 12.10 libcaca bitmap dithering

### Functions

- `__extern caca_dither_t * caca_create_dither (int, int, int, int, uint32_t, uint32_t, uint32_t, uint32_t)`  
*Create an internal dither object.*

- `__extern int caca\_set\_dither\_palette (caca\_dither\_t *, uint32_t r[], uint32_t g[], uint32_t b[], uint32_t a[])`  
*Set the palette of an 8bpp dither object.*
- `__extern int caca\_set\_dither\_brightness (caca\_dither\_t *, float)`  
*Set the brightness of a dither object.*
- `__extern float caca\_get\_dither\_brightness (caca\_dither\_t const *)`  
*Get the brightness of a dither object.*
- `__extern int caca\_set\_dither\_gamma (caca\_dither\_t *, float)`  
*Set the gamma of a dither object.*
- `__extern float caca\_get\_dither\_gamma (caca\_dither\_t const *)`  
*Get the gamma of a dither object.*
- `__extern int caca\_set\_dither\_contrast (caca\_dither\_t *, float)`  
*Set the contrast of a dither object.*
- `__extern float caca\_get\_dither\_contrast (caca\_dither\_t const *)`  
*Get the contrast of a dither object.*
- `__extern int caca\_set\_dither\_antialias (caca\_dither\_t *, char const *)`  
*Set dither antialiasing.*
- `__extern char const *const * caca\_get\_dither\_antialias\_list (caca\_dither\_t const *)`  
*Get available antialiasing methods.*
- `__extern char const * caca\_get\_dither\_antialias (caca\_dither\_t const *)`  
*Get current antialiasing method.*
- `__extern int caca\_set\_dither\_color (caca\_dither\_t *, char const *)`  
*Choose colours used for dithering.*
- `__extern char const *const * caca\_get\_dither\_color\_list (caca\_dither\_t const *)`  
*Get available colour modes.*
- `__extern char const * caca\_get\_dither\_color (caca\_dither\_t const *)`  
*Get current colour mode.*
- `__extern int caca\_set\_dither\_charset (caca\_dither\_t *, char const *)`  
*Choose characters used for dithering.*
- `__extern char const *const * caca\_get\_dither\_charset\_list (caca\_dither\_t const *)`  
*Get available dither character sets.*
- `__extern char const * caca\_get\_dither\_charset (caca\_dither\_t const *)`  
*Get current character set.*
- `__extern int caca\_set\_dither\_algorithm (caca\_dither\_t *, char const *)`

*Set dithering algorithm.*

- `__extern char const *const * caca\_get\_dither\_algorithm\_list (caca\_dither\_t const *)`  
*Get dithering algorithms.*
- `__extern char const * caca\_get\_dither\_algorithm (caca\_dither\_t const *)`  
*Get current dithering algorithm.*
- `__extern int caca\_dither\_bitmap (caca\_canvas\_t *, int, int, int, int, caca\_dither\_t const *, void const *)`  
*Dither a bitmap on the canvas.*
- `__extern int caca\_free\_dither (caca\_dither\_t *)`  
*Free the memory associated with a dither.*

### 12.10.1 Detailed Description

These functions provide high level routines for dither allocation and rendering.

### 12.10.2 Function Documentation

#### 12.10.2.1 `__extern caca\_dither\_t* caca\_create\_dither (int bpp, int w, int h, int pitch, uint32\_t rmask, uint32\_t gmask, uint32\_t bmask, uint32\_t amask)`

Create a dither structure from its coordinates (depth, width, height and pitch) and pixel mask values. If the depth is 8 bits per pixel, the mask values are ignored and the colour palette should be set using the [caca\\_set\\_dither\\_palette\(\)](#) function. For depths greater than 8 bits per pixel, a zero alpha mask causes the alpha values to be ignored.

If an error occurs, NULL is returned and **errno** is set accordingly:

- **EINVAL** Requested width, height, pitch or bits per pixel value was invalid.
- **ENOMEM** Not enough memory to allocate dither structure.

#### Parameters:

***bpp*** Bitmap depth in bits per pixel.  
***w*** Bitmap width in pixels.  
***h*** Bitmap height in pixels.  
***pitch*** Bitmap pitch in bytes.  
***rmask*** Bitmask for red values.  
***gmask*** Bitmask for green values.  
***bmask*** Bitmask for blue values.  
***amask*** Bitmask for alpha values.

#### Returns:

Dither object upon success, NULL if an error occurred.

### 12.10.2.2 `__extern int caca_set_dither_palette (caca_dither_t * d, uint32_t red[], uint32_t green[], uint32_t blue[], uint32_t alpha[])`

Set the palette of an 8 bits per pixel bitmap. Values should be between 0 and 4095 (0xffff).

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Dither bits per pixel value is not 8, or one of the pixel values was outside the range 0 - 4095.

#### Parameters:

*d* Dither object.

*red* Array of 256 red values.

*green* Array of 256 green values.

*blue* Array of 256 blue values.

*alpha* Array of 256 alpha values.

#### Returns:

0 in case of success, -1 if an error occurred.

### 12.10.2.3 `__extern int caca_set_dither_brightness (caca_dither_t * d, float brightness)`

Set the brightness of dither.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Brightness value was out of range.

#### Parameters:

*d* Dither object.

*brightness* brightness value.

#### Returns:

0 in case of success, -1 if an error occurred.

### 12.10.2.4 `__extern float caca_get_dither_brightness (caca_dither_t const * d)`

Get the brightness of the given dither object.

This function never fails.

#### Parameters:

*d* Dither object.

#### Returns:

Brightness value.

**12.10.2.5** `__extern int caca_set_dither_gamma (caca_dither_t * d, float gamma)`

Set the gamma of the given dither object. A negative value causes colour inversion.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Gamma value was out of range.

**Parameters:**

*d* Dither object.

*gamma* Gamma value.

**Returns:**

0 in case of success, -1 if an error occurred.

**12.10.2.6** `__extern float caca_get_dither_gamma (caca_dither_t const * d)`

Get the gamma of the given dither object.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

Gamma value.

**12.10.2.7** `__extern int caca_set_dither_contrast (caca_dither_t * d, float contrast)`

Set the contrast of dither.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Contrast value was out of range.

**Parameters:**

*d* Dither object.

*contrast* contrast value.

**Returns:**

0 in case of success, -1 if an error occurred.

### 12.10.2.8 `__extern float caca_get_dither_contrast (caca_dither_t const * d)`

Get the contrast of the given dither object.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

Contrast value.

### 12.10.2.9 `__extern int caca_set_dither_antialias (caca_dither_t * d, char const * str)`

Tell the renderer whether to antialias the dither. Antialiasing smoothens the rendered image and avoids the commonly seen staircase effect.

- "none": no antialiasing.
- "prefilter" or "default": simple prefilter antialiasing. This is the default value.

If an error occurs, -1 is returned and **errno** is set accordingly:

- EINVAL Invalid antialiasing mode.

**Parameters:**

*d* Dither object.

*str* A string describing the antialiasing method that will be used for the dithering.

**Returns:**

0 in case of success, -1 if an error occurred.

### 12.10.2.10 `__extern char const* const* caca_get_dither_antialias_list (caca_dither_t const * d)`

Return a list of available antialiasing methods for a given dither. The list is a NULL-terminated array of strings, interleaving a string containing the internal value for the antialiasing method to be used with [caca\\_set\\_dither\\_antialias\(\)](#), and a string containing the natural language description for that antialiasing method.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

An array of strings.



**12.10.2.11** `__extern char const* caca_get_dither_antialias (caca_dither_t const * d)`

Return the given dither's current antialiasing method.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

A static string.

**12.10.2.12** `__extern int caca_set_dither_color (caca_dither_t * d, char const * str)`

Tell the renderer which colours should be used to render the bitmap. Valid values for *str* are:

- "mono": use light gray on a black background.
- "gray": use white and two shades of gray on a black background.
- "8": use the 8 ANSI colours on a black background.
- "16": use the 16 ANSI colours on a black background.
- "fullgray": use black, white and two shades of gray for both the characters and the background.
- "full8": use the 8 ANSI colours for both the characters and the background.
- "full16" or "default": use the 16 ANSI colours for both the characters and the background. This is the default value.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Invalid colour set.

**Parameters:**

*d* Dither object.

*str* A string describing the colour set that will be used for the dithering.

**Returns:**

0 in case of success, -1 if an error occurred.

**12.10.2.13** `__extern char const* const* caca_get_dither_color_list (caca_dither_t const * d)`

Return a list of available colour modes for a given dither. The list is a NULL-terminated array of strings, interleaving a string containing the internal value for the colour mode, to be used with [caca\\_set\\_dither\\_color\(\)](#), and a string containing the natural language description for that colour mode.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

An array of strings.

**12.10.2.14** `__extern char const* caca_get_dither_color (caca_dither_t const * d)`

Return the given dither's current colour mode.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

A static string.

**12.10.2.15** `__extern int caca_set_dither_charset (caca_dither_t * d, char const * str)`

Tell the renderer which characters should be used to render the dither. Valid values for *str* are:

- "ascii" or "default": use only ASCII characters. This is the default value.
- "shades": use Unicode characters "U+2591 LIGHT SHADE", "U+2592 MEDIUM SHADE" and "U+2593 DARK SHADE". These characters are also present in the CP437 codepage available on DOS and VGA.
- "blocks": use Unicode quarter-cell block combinations. These characters are only found in the Unicode set.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Invalid character set.

**Parameters:**

*d* Dither object.

*str* A string describing the characters that need to be used for the dithering.

**Returns:**

0 in case of success, -1 if an error occurred.

**12.10.2.16** `__extern char const* const* caca_get_dither_charset_list (caca_dither_t const * d)`

Return a list of available character sets for a given dither. The list is a NULL-terminated array of strings, interleaving a string containing the internal value for the character set, to be used with `caca_set_dither_charset()`, and a string containing the natural language description for that character set.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

An array of strings.

**12.10.2.17** `__extern char const* caca_get_dither_charset (caca_dither_t const * d)`

Return the given dither's current character set.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

A static string.

**12.10.2.18** `__extern int caca_set_dither_algorithm (caca_dither_t * d, char const * str)`

Tell the renderer which dithering algorithm should be used. Dithering is necessary because the picture being rendered has usually far more colours than the available palette. Valid values for `str` are:

- "none": no dithering is used, the nearest matching colour is used.
- "ordered2": use a 2x2 Bayer matrix for dithering.
- "ordered4": use a 4x4 Bayer matrix for dithering.
- "ordered8": use a 8x8 Bayer matrix for dithering.
- "random": use random dithering.
- "fstein": use Floyd-Steinberg dithering. This is the default value.

If an error occurs, -1 is returned and `errno` is set accordingly:

- `EINVAL` Unknown dithering mode.

**Parameters:**

*d* Dither object.

*str* A string describing the algorithm that needs to be used for the dithering.

**Returns:**

0 in case of success, -1 if an error occurred.

**12.10.2.19** `__extern char const* const* caca_get_dither_algorithm_list (caca_dither_t const * d)`

Return a list of available dithering algorithms for a given dither. The list is a NULL-terminated array of strings, interleaving a string containing the internal value for the dithering algorithm, to be used with `caca_set_dither_dithering()`, and a string containing the natural language description for that algorithm.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

An array of strings.

**12.10.2.20** `__extern char const* caca_get_dither_algorithm (caca_dither_t const * d)`

Return the given dither's current dithering algorithm.

This function never fails.

**Parameters:**

*d* Dither object.

**Returns:**

A static string.

**12.10.2.21** `__extern int caca_dither_bitmap (caca_canvas_t * cv, int x, int y, int w, int h, caca_dither_t const * d, void const * pixels)`

Dither a bitmap at the given coordinates. The dither can be of any size and will be stretched to the text area.

This function never fails.

**Parameters:**

*cv* A handle to the libcaca canvas.

***x*** X coordinate of the upper-left corner of the drawing area.  
***y*** Y coordinate of the upper-left corner of the drawing area.  
***w*** Width of the drawing area.  
***h*** Height of the drawing area.  
***d*** Dither object to be drawn.  
***pixels*** Bitmap's pixels.

**Returns:**

This function always returns 0.

References CACA\_BLACK, [caca\\_get\\_attr\(\)](#), [caca\\_put\\_char\(\)](#), [caca\\_set\\_attr\(\)](#), and [caca\\_set\\_color\\_ansi\(\)](#).

**12.10.2.22 \_\_extern int caca\_free\_dither (caca\_dither\_t \* d)**

Free the memory allocated by [caca\\_create\\_dither\(\)](#).

This function never fails.

**Parameters:**

***d*** Dither object.

**Returns:**

This function always returns 0.

**12.11 libcaca font handling****Functions**

- **\_\_extern [caca\\_font\\_t](#) \* [caca\\_load\\_font](#)** (void const \*, size\_t)  
*Load a font from memory for future use.*
- **\_\_extern char const \*const \* [caca\\_get\\_font\\_list](#)** (void)  
*Get available builtin fonts.*
- **\_\_extern int [caca\\_get\\_font\\_width](#)** ([caca\\_font\\_t](#) const \*)  
*Get a font's standard glyph width.*
- **\_\_extern int [caca\\_get\\_font\\_height](#)** ([caca\\_font\\_t](#) const \*)  
*Get a font's standard glyph height.*
- **\_\_extern uint32\_t const \* [caca\\_get\\_font\\_blocks](#)** ([caca\\_font\\_t](#) const \*)  
*Get a font's list of supported glyphs.*
- **\_\_extern int [caca\\_render\\_canvas](#)** ([caca\\_canvas\\_t](#) const \*, [caca\\_font\\_t](#) const \*, void \*, int, int, int)  
*Render the canvas onto an image buffer.*
- **\_\_extern int [caca\\_free\\_font](#)** ([caca\\_font\\_t](#) \*)  
*Free a font structure.*

### 12.11.1 Detailed Description

These functions provide font handling routines and high quality canvas to bitmap rendering.

### 12.11.2 Function Documentation

#### 12.11.2.1 `__extern caca_font_t* caca_load_font (void const * data, size_t size)`

This function loads a font and returns a handle to its internal structure. The handle can then be used with [caca\\_render\\_canvas\(\)](#) for bitmap output.

Internal fonts can also be loaded: if *size* is set to 0, *data* must be a string containing the internal font name.

If *size* is non-zero, the *size* bytes of memory at address *data* are loaded as a font. This memory are must not be freed by the calling program until the font handle has been freed with [caca\\_free\\_font\(\)](#).

If an error occurs, NULL is returned and **errno** is set accordingly:

- ENOENT Requested built-in font does not exist.
- EINVAL Invalid font data in memory area.
- ENOMEM Not enough memory to allocate font structure.

#### Parameters:

*data* The memory area containing the font or its name.

*size* The size of the memory area, or 0 if the font name is given.

#### Returns:

A font handle or NULL in case of error.

References [caca\\_load\\_font\(\)](#).

Referenced by [caca\\_load\\_font\(\)](#).

#### 12.11.2.2 `__extern char const* const* caca_get_font_list (void)`

Return a list of available builtin fonts. The list is a NULL-terminated array of strings.

This function never fails.

#### Returns:

An array of strings.

#### 12.11.2.3 `__extern int caca_get_font_width (caca_font_t const *f)`

Return the standard value for the current font's glyphs. Most glyphs in the font will have this width, except fullwidth characters.

This function never fails.

**Parameters:**

*f* The font, as returned by [caca\\_load\\_font\(\)](#)

**Returns:**

The standard glyph width.

#### 12.11.2.4 `__extern int caca_get_font_height (caca_font_t const *f)`

Returns the standard value for the current font's glyphs. Most glyphs in the font will have this height.

This function never fails.

**Parameters:**

*f* The font, as returned by [caca\\_load\\_font\(\)](#)

**Returns:**

The standard glyph height.

#### 12.11.2.5 `__extern uint32_t const* caca_get_font_blocks (caca_font_t const *f)`

This function returns the list of Unicode blocks supported by the given font. The list is a zero-terminated list of indices. Here is an example:

```
{
    0x0000, 0x0080,    // Basic latin: A, B, C, a, b, c
    0x0080, 0x0100,    // Latin-1 supplement: "A, 'e, ^u
    0x0530, 0x0590,    // Armenian
    0x0000, 0x0000,    // END
};
```

This function never fails.

**Parameters:**

*f* The font, as returned by [caca\\_load\\_font\(\)](#)

**Returns:**

The list of Unicode blocks supported by the font.

### 12.11.2.6 `__extern int caca_render_canvas (caca_canvas_t const * cv, caca_font_t const * f, void * buf, int width, int height, int pitch)`

This function renders the given canvas on an image buffer using a specific font. The pixel format is fixed (32-bit ARGB, 8 bits for each component).

The required image width can be computed using [caca\\_get\\_canvas\\_width\(\)](#) and [caca\\_get\\_font\\_width\(\)](#). The required height can be computed using [caca\\_get\\_canvas\\_height\(\)](#) and [caca\\_get\\_font\\_height\(\)](#).

Glyphs that do not fit in the image buffer are currently not rendered at all. They may be cropped instead in future versions.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Specified width, height or pitch is invalid.

#### Parameters:

*cv* The canvas to render

*f* The font, as returned by [caca\\_load\\_font\(\)](#)

*buf* The image buffer

*width* The width (in pixels) of the image buffer

*height* The height (in pixels) of the image buffer

*pitch* The pitch (in bytes) of an image buffer line.

#### Returns:

0 in case of success, -1 if an error occurred.

References [caca\\_attr\\_to\\_argb64\(\)](#).

### 12.11.2.7 `__extern int caca_free_font (caca_font_t * f)`

This function frees all data allocated by [caca\\_load\\_font\(\)](#). The font structure is no longer usable by other libcaca functions. Once this function has returned, the memory area that was given to [caca\\_load\\_font\(\)](#) can be freed.

This function never fails.

#### Parameters:

*f* The font, as returned by [caca\\_load\\_font\(\)](#)

#### Returns:

This function always returns 0.

## 12.12 libcaca FIGfont handling

### Functions

- `__extern int caca_canvas_set_figfont (caca_canvas_t *, char const *)`



*load a figfont and attach it to a canvas*

- `__extern int caca_put_figchar (caca_canvas_t *, uint32_t)`  
*paste a character using the current figfont*
- `__extern int caca_flush_figlet (caca_canvas_t *)`  
*flush the figlet context*

### 12.12.1 Detailed Description

These functions provide FIGlet and TOIlet font handling routines.

## 12.13 libcaca file IO

### Functions

- `__extern caca_file_t * caca_file_open (char const *, const char *)`  
*Open a file for reading or writing.*
- `__extern int caca_file_close (caca_file_t *)`  
*Close a file handle.*
- `__extern uint64_t caca_file_tell (caca_file_t *)`  
*Return the position in a file handle.*
- `__extern size_t caca_file_read (caca_file_t *, void *, size_t)`  
*Read data from a file handle.*
- `__extern size_t caca_file_write (caca_file_t *, const void *, size_t)`  
*Write data to a file handle.*
- `__extern char * caca_file_gets (caca_file_t *, char *, int)`  
*Read a line from a file handle.*
- `__extern int caca_file_eof (caca_file_t *)`  
*Tell whether a file handle reached end of file.*

### 12.13.1 Detailed Description

These functions allow to read and write files in a platform-independent way.

### 12.13.2 Function Documentation

#### 12.13.2.1 `__extern caca_file_t* caca_file_open (char const * path, const char * mode)`

Create a caca file handle for a file. If the file is zipped, it is decompressed on the fly.

If an error occurs, NULL is returned and **errno** is set accordingly:

- **ENOSTS** Function not implemented.
- **EINVAL** File not found or permission denied.

**Parameters:**

*path* The file path

*mode* The file open mode

**Returns:**

A file handle to *path*.

Referenced by `caca_import_canvas_from_file()`.

### 12.13.2.2 `__extern int caca_file_close (caca_file_t *fp)`

Close and destroy the resources associated with a caca file handle.

This function is a wrapper for `fclose()` or, if available, `gzclose()`.

**Parameters:**

*fp* The file handle

**Returns:**

The return value of `fclose()` or `gzclose()`.

Referenced by `caca_import_canvas_from_file()`.

### 12.13.2.3 `__extern uint64_t caca_file_tell (caca_file_t *fp)`

Return the file handle position, in bytes.

**Parameters:**

*fp* The file handle

**Returns:**

The current offset in the file handle.

**12.13.2.4** `__extern size_t caca_file_read (caca_file_t * fp, void * ptr, size_t size)`

Read data from a file handle and copy them into the given buffer.

**Parameters:**

*fp* The file handle  
*ptr* The destination buffer  
*size* The number of bytes to read

**Returns:**

The number of bytes read

Referenced by `caca_import_canvas_from_file()`.

**12.13.2.5** `__extern size_t caca_file_write (caca_file_t * fp, const void * ptr, size_t size)`

Write the contents of the given buffer to the file handle.

**Parameters:**

*fp* The file handle  
*ptr* The source buffer  
*size* The number of bytes to write

**Returns:**

The number of bytes written

**12.13.2.6** `__extern char* caca_file_gets (caca_file_t * fp, char * s, int size)`

Read one line of data from a file handle, up to one less than the given number of bytes. A trailing zero is appended to the data.

**Parameters:**

*fp* The file handle  
*s* The destination buffer  
*size* The maximum number of bytes to read

**Returns:**

The number of bytes read, including the trailing zero

**12.13.2.7** `__extern int caca_file_eof (caca_file_t *fp)`

Return the end-of-file status of the file handle.

This function is a wrapper for `feof()` or, if available, `gzeof()`.

**Parameters:**

*fp* The file handle

**Returns:**

1 if EOF was reached, 0 otherwise

Referenced by `caca_import_canvas_from_file()`.

**12.14 libcaca importers/exporters from/to various****Functions**

- `__extern ssize_t caca_import_canvas_from_memory (caca_canvas_t *, void const *, size_t, char const *)`  
*Import a memory buffer into a canvas.*
- `__extern ssize_t caca_import_canvas_from_file (caca_canvas_t *, char const *, char const *)`  
*Import a file into a canvas.*
- `__extern ssize_t caca_import_area_from_memory (caca_canvas_t *, int, int, void const *, size_t, char const *)`  
*Import a memory buffer into a canvas area.*
- `__extern ssize_t caca_import_area_from_file (caca_canvas_t *, int, int, char const *, char const *)`  
*Import a file into a canvas area.*
- `__extern char const *const * caca_get_import_list (void)`  
*Get available import formats.*
- `__extern void * caca_export_canvas_to_memory (caca_canvas_t const *, char const *, size_t *)`  
*Export a canvas into a foreign format.*
- `__extern void * caca_export_area_to_memory (caca_canvas_t const *, int, int, int, int, char const *, size_t *)`  
*Export a canvas portion into a foreign format.*
- `__extern char const *const * caca_get_export_list (void)`  
*Get available export formats.*

### 12.14.1 Detailed Description

formats

These functions import various file formats into a new canvas, or export the current canvas to various text formats.

### 12.14.2 Function Documentation

#### 12.14.2.1 `__extern ssize_t caca_import_canvas_from_memory (caca_canvas_t * cv, void const * data, size_t len, char const * format)`

Import a memory buffer into the given libcaca canvas's current frame. The current frame is resized accordingly and its contents are replaced with the imported data.

Valid values for `format` are:

- `"`: attempt to autodetect the file format.
- `"caca"`: import native libcaca files.
- `"text"`: import ASCII text files.
- `"ansi"`: import ANSI files.
- `"utf8"`: import UTF-8 files with ANSI colour codes.

The number of bytes read is returned. If the file format is valid, but not enough data was available, 0 is returned.

If an error occurs, -1 is returned and **errno** is set accordingly:

- `ENOMEM` Not enough memory to allocate canvas.
- `EINVAL` Invalid format requested.

#### Parameters:

***cv*** A libcaca canvas in which to import the file.  
***data*** A memory area containing the data to be loaded into the canvas.  
***len*** The size in bytes of the memory area.  
***format*** A string describing the input format.

#### Returns:

The number of bytes read, or 0 if there was not enough data, or -1 if an error occurred.

Referenced by `caca_import_area_from_memory()`, and `caca_import_canvas_from_file()`.

#### 12.14.2.2 `__extern ssize_t caca_import_canvas_from_file (caca_canvas_t * cv, char const * filename, char const * format)`

Import a file into the given libcaca canvas's current frame. The current frame is resized accordingly and its contents are replaced with the imported data.

Valid values for `format` are:

- `"`: attempt to autodetect the file format.
- `"caca"`: import native libcaca files.
- `"text"`: import ASCII text files.
- `"ansi"`: import ANSI files.
- `"utf8"`: import UTF-8 files with ANSI colour codes.

The number of bytes read is returned. If the file format is valid, but not enough data was available, 0 is returned.

If an error occurs, -1 is returned and **errno** is set accordingly:

- `ENOSYS` File access is not implemented on this system.
- `ENOMEM` Not enough memory to allocate canvas.
- `EINVAL` Invalid format requested. `caca_import_file()` may also fail and set **errno** for any of the errors specified for the routine `fopen()`.

#### Parameters:

*cv* A libcaca canvas in which to import the file.

*filename* The name of the file to load.

*format* A string describing the input format.

#### Returns:

The number of bytes read, or 0 if there was not enough data, or -1 if an error occurred.

References `caca_file_close()`, `caca_file_eof()`, `caca_file_open()`, `caca_file_read()`, and `caca_import_canvas_from_memory()`.

Referenced by `caca_import_area_from_file()`.

#### 12.14.2.3 `__extern ssize_t caca_import_area_from_memory (caca_canvas_t * cv, int x, int y, void const * data, size_t len, char const * format)`

Import a memory buffer into the given libcaca canvas's current frame, at the specified position. For more information, see [caca\\_import\\_canvas\\_from\\_memory\(\)](#).

If an error occurs, -1 is returned and **errno** is set accordingly:

- `EINVAL` Unsupported format requested or invalid coordinates.
- `ENOMEM` Not enough memory to allocate canvas.

#### Parameters:

*cv* A libcaca canvas in which to import the file.

*x* The leftmost coordinate of the area to import to.  
*y* The topmost coordinate of the area to import to.  
*data* A memory area containing the data to be loaded into the canvas.  
*len* The size in bytes of the memory area.  
*format* A string describing the input format.

**Returns:**

The number of bytes read, or 0 if there was not enough data, or -1 if an error occurred.

References `caca_blit()`, `caca_create_canvas()`, `caca_free_canvas()`, and `caca_import_canvas_from_memory()`.

#### 12.14.2.4 `__extern ssize_t caca_import_area_from_file (caca_canvas_t *cv, int x, int y, char const *filename, char const *format)`

Import a file into the given libcaca canvas's current frame, at the specified position. For more information, see [caca\\_import\\_canvas\\_from\\_file\(\)](#).

If an error occurs, -1 is returned and **errno** is set accordingly:

- **ENOSYS** File access is not implemented on this system.
- **ENOMEM** Not enough memory to allocate canvas.
- **EINVAL** Unsupported format requested or invalid coordinates. `caca_import_file()` may also fail and set **errno** for any of the errors specified for the routine `fopen()`.

**Parameters:**

*cv* A libcaca canvas in which to import the file.  
*x* The leftmost coordinate of the area to import to.  
*y* The topmost coordinate of the area to import to.  
*filename* The name of the file to load.  
*format* A string describing the input format.

**Returns:**

The number of bytes read, or 0 if there was not enough data, or -1 if an error occurred.

References `caca_blit()`, `caca_create_canvas()`, `caca_free_canvas()`, and `caca_import_canvas_from_file()`.

#### 12.14.2.5 `__extern char const* const* caca_get_import_list (void)`

Return a list of available import formats. The list is a NULL-terminated array of strings, interleaving a string containing the internal value for the import format, to be used with `caca_import_canvas()`, and a string containing the natural language description for that import format.

This function never fails.

**Returns:**

An array of strings.

#### 12.14.2.6 `__extern void* caca_export_canvas_to_memory (caca_canvas_t const * cv, char const * format, size_t * bytes)`

This function exports a libcaca canvas into various foreign formats such as ANSI art, HTML, IRC colours, etc. The returned pointer should be passed to `free()` to release the allocated storage when it is no longer needed.

Valid values for `format` are:

- `"caca"`: export native libcaca files.
- `"ansi"`: export ANSI art (CP437 charset with ANSI colour codes).
- `"html"`: export an HTML page with CSS information.
- `"html3"`: export an HTML table that should be compatible with most navigators, including textmode ones.
- `"irc"`: export UTF-8 text with mIRC colour codes.
- `"ps"`: export a PostScript document.
- `"svg"`: export an SVG vector image.
- `"tga"`: export a TGA image.
- `"troff"`: export a troff source.

If an error occurs, `NULL` is returned and **errno** is set accordingly:

- `EINVAL` Unsupported format requested.
- `ENOMEM` Not enough memory to allocate output buffer.

#### Parameters:

*cv* A libcaca canvas

*format* A string describing the requested output format.

*bytes* A pointer to a `size_t` where the number of allocated bytes will be written.

#### Returns:

A pointer to the exported memory area, or `NULL` in case of error.

Referenced by `caca_export_area_to_memory()`.

#### 12.14.2.7 `__extern void* caca_export_area_to_memory (caca_canvas_t const * cv, int x, int y, int w, int h, char const * format, size_t * bytes)`

This function exports a portion of a *libcaca* canvas into various formats. For more information, see [caca\\_export\\_canvas\\_to\\_memory\(\)](#).

If an error occurs, `NULL` is returned and **errno** is set accordingly:



- `EINVAL` Unsupported format requested or invalid coordinates.
- `ENOMEM` Not enough memory to allocate output buffer.

**Parameters:**

- cv* A libcaca canvas
- x* The leftmost coordinate of the area to export.
- y* The topmost coordinate of the area to export.
- w* The width of the area to export.
- h* The height of the area to export.
- format* A string describing the requested output format.
- bytes* A pointer to a `size_t` where the number of allocated bytes will be written.

**Returns:**

A pointer to the exported memory area, or `NULL` in case of error.

References `caca_blit()`, `caca_create_canvas()`, `caca_export_canvas_to_memory()`, and `caca_free_canvas()`.

**12.14.2.8 \_\_extern char const\* const\* caca\_get\_export\_list (void)**

Return a list of available export formats. The list is a `NULL`-terminated array of strings, interleaving a string containing the internal value for the export format, to be used with `caca_export_memory()`, and a string containing the natural language description for that export format.

This function never fails.

**Returns:**

An array of strings.

**12.15 libcaca display functions****Functions**

- \_\_extern `caca_display_t * caca_create_display (caca_canvas_t *)`  
*Attach a caca graphical context to a caca canvas.*
- \_\_extern `caca_display_t * caca_create_display_with_driver (caca_canvas_t *, char const *)`  
*Attach a specific caca graphical context to a caca canvas.*
- \_\_extern `char const *const * caca_get_display_driver_list (void)`  
*Get available display drivers.*
- \_\_extern `char const * caca_get_display_driver (caca_display_t *)`  
*Return a caca graphical context's current output driver.*
- \_\_extern `int caca_set_display_driver (caca_display_t *, char const *)`  
*Set the output driver.*

- `__extern int caca\_free\_display (caca\_display\_t *)`  
*Detach a caca graphical context from a caca backend context.*
- `__extern caca\_canvas\_t * caca\_get\_canvas (caca\_display\_t *)`  
*Get the canvas attached to a caca graphical context.*
- `__extern int caca\_refresh\_display (caca\_display\_t *)`  
*Flush pending changes and redraw the screen.*
- `__extern int caca\_set\_display\_time (caca\_display\_t *, int)`  
*Set the refresh delay.*
- `__extern int caca\_get\_display\_time (caca\_display\_t const *)`  
*Get the display's average rendering time.*
- `__extern int caca\_get\_display\_width (caca\_display\_t const *)`  
*Get the display width.*
- `__extern int caca\_get\_display\_height (caca\_display\_t const *)`  
*Get the display height.*
- `__extern int caca\_set\_display\_title (caca\_display\_t *, char const *)`  
*Set the display title.*
- `__extern int caca\_set\_mouse (caca\_display\_t *, int)`  
*Show or hide the mouse pointer.*
- `__extern int caca\_set\_cursor (caca\_display\_t *, int)`  
*Show or hide the cursor.*

### 12.15.1 Detailed Description

These functions provide the basic *libcaca* routines for display initialisation, system information retrieval and configuration.

### 12.15.2 Function Documentation

#### 12.15.2.1 `__extern caca\_display\_t* caca\_create\_display (caca\_canvas\_t * cv)`

Create a graphical context using device-dependent features (ncurses for terminals, an X11 window, a DOS command window...) that attaches to a libcaca canvas. Everything that gets drawn in the libcaca canvas can then be displayed by the libcaca driver.

If no caca canvas is provided, a new one is created. Its handle can be retrieved using [caca\\_get\\_canvas\(\)](#) and it is automatically destroyed when [caca\\_free\\_display\(\)](#) is called.

See also [caca\\_create\\_display\\_with\\_driver\(\)](#).

If an error occurs, NULL is returned and **errno** is set accordingly:

- ENOMEM Not enough memory.
- ENODEV Graphical device could not be initialised.

**Parameters:**

*cv* The caca canvas or NULL to create a canvas automatically.

**Returns:**

The caca graphical context or NULL if an error occurred.

References `caca_create_display_with_driver()`.

**12.15.2.2 `__extern caca_display_t* caca_create_display_with_driver (caca_canvas_t * cv, char const * driver)`**

Create a graphical context using device-dependent features (ncurses for terminals, an X11 window, a DOS command window...) that attaches to a libcaca canvas. Everything that gets drawn in the libcaca canvas can then be displayed by the libcaca driver.

If no caca canvas is provided, a new one is created. Its handle can be retrieved using `caca_get_canvas()` and it is automatically destroyed when `caca_free_display()` is called.

If no driver name is provided, *libcaca* will try to autodetect the best output driver it can.

See also `caca_create_display()`.

If an error occurs, NULL is returned and **errno** is set accordingly:

- ENOMEM Not enough memory.
- ENODEV Graphical device could not be initialised.

**Parameters:**

*cv* The caca canvas or NULL to create a canvas automatically.

*driver* A string describing the desired output driver or NULL to choose the best driver automatically.

**Returns:**

The caca graphical context or NULL if an error occurred.

References `caca_create_canvas()`, `caca_free_canvas()`, `caca_manage_canvas()`, and `caca_unmanage_canvas()`.

Referenced by `caca_create_display()`.

**12.15.2.3 `__extern char const* const* caca_get_display_driver_list (void)`**

Return a list of available display drivers. The list is a NULL-terminated array of strings, interleaving a string containing the internal value for the display driver, and a string containing the natural language description for that driver.

This function never fails.

**Returns:**

An array of strings.

**12.15.2.4** `__extern char const* caca_get_display_driver (caca_display_t * dp)`

Return the given display's current output driver.

This function never fails.

**Parameters:**

*dp* The caca display.

**Returns:**

A static string.

**12.15.2.5** `__extern int caca_set_display_driver (caca_display_t * dp, char const * driver)`

Dynamically change the given display's output driver.

FIXME: decide what to do in case of failure

**Parameters:**

*dp* The caca display.

*driver* A string describing the desired output driver or NULL to choose the best driver automatically.

**Returns:**

0 in case of success, -1 if an error occurred.

**12.15.2.6** `__extern int caca_free_display (caca_display_t * dp)`

Detach a graphical context from its caca backend and destroy it. The libcaca canvas continues to exist and other graphical contexts can be attached to it afterwards.

If the caca canvas was automatically created by [caca\\_create\\_display\(\)](#), it is automatically destroyed and any handle to it becomes invalid.

This function never fails.

**Parameters:**

*dp* The libcaca graphical context.

**Returns:**

This function always returns 0.

References [caca\\_free\\_canvas\(\)](#), and [caca\\_unmanage\\_canvas\(\)](#).

### 12.15.2.7 `__extern caca_canvas_t* caca_get_canvas (caca_display_t * dp)`

Return a handle on the `caca_canvas_t` object that was either attached or created by [caca\\_create\\_display\(\)](#). This function never fails.

**Parameters:**

*dp* The libcaca graphical context.

**Returns:**

The libcaca canvas.

### 12.15.2.8 `__extern int caca_refresh_display (caca_display_t * dp)`

Flush all graphical operations and print them to the display device. Nothing will show on the screen until this function is called.

If [caca\\_set\\_display\\_time\(\)](#) was called with a non-zero value, [caca\\_refresh\\_display\(\)](#) will use that value to achieve constant framerate: if two consecutive calls to [caca\\_refresh\\_display\(\)](#) are within a time range shorter than the value set with [caca\\_set\\_display\\_time\(\)](#), the second call will be delayed before performing the screen refresh.

This function never fails.

**Parameters:**

*dp* The libcaca display context.

**Returns:**

This function always returns 0.

References [caca\\_clear\\_dirty\\_rect\\_list\(\)](#).

### 12.15.2.9 `__extern int caca_set_display_time (caca_display_t * dp, int usec)`

Set the refresh delay in microseconds. The refresh delay is used by [caca\\_refresh\\_display\(\)](#) to achieve constant framerate. See the [caca\\_refresh\\_display\(\)](#) documentation for more details.

If the argument is zero, constant framerate is disabled. This is the default behaviour.

If an error occurs, -1 is returned and **errno** is set accordingly:

- **EINVAL** Refresh delay value is invalid.

**Parameters:**

*dp* The libcaca display context.

*usec* The refresh delay in microseconds.

**Returns:**

0 upon success, -1 if an error occurred.

**12.15.2.10 `__extern int caca_get_display_time (caca_display_t const * dp)`**

Get the average rendering time, which is the average measured time between two [caca\\_refresh\\_display\(\)](#) calls, in microseconds. If constant framerate was activated by calling [caca\\_set\\_display\\_time\(\)](#), the average rendering time will be close to the requested delay even if the real rendering time was shorter.

This function never fails.

**Parameters:**

*dp* The libcaca display context.

**Returns:**

The render time in microseconds.

**12.15.2.11 `__extern int caca_get_display_width (caca_display_t const * dp)`**

If libcaca runs in a window, get the usable window width. This value can be used for aspect ratio calculation. If libcaca does not run in a window or if there is no way to know the font size, most drivers will assume a 6x10 font is being used. Note that the units are not necessarily pixels.

This function never fails.

**Parameters:**

*dp* The libcaca display context.

**Returns:**

The display width.

**12.15.2.12 `__extern int caca_get_display_height (caca_display_t const * dp)`**

If libcaca runs in a window, get the usable window height. This value can be used for aspect ratio calculation. If libcaca does not run in a window or if there is no way to know the font size, assume a 6x10 font is being used. Note that the units are not necessarily pixels.

This function never fails.

**Parameters:**

*dp* The libcaca display context.

**Returns:**

The display height.

**12.15.2.13** `__extern int caca_set_display_title (caca_display_t * dp, char const * title)`

If libcaca runs in a window, try to change its title. This works with the ncurses, S-Lang, OpenGL, X11 and Win32 drivers.

If an error occurs, -1 is returned and **errno** is set accordingly:

- ENOSYS Display driver does not support setting the window title.

**Parameters:**

*dp* The libcaca display context.

*title* The desired display title.

**Returns:**

0 upon success, -1 if an error occurred.

**12.15.2.14** `__extern int caca_set_mouse (caca_display_t * dp, int flag)`

Show or hide the mouse pointer. This function works with the ncurses, S-Lang and X11 drivers.

If an error occurs, -1 is returned and **errno** is set accordingly:

- ENOSYS Display driver does not support hiding the mouse pointer.

**Parameters:**

*dp* The libcaca display context.

*flag* 0 hides the pointer, 1 shows the system's default pointer (usually an arrow). Other values are reserved for future use.

**Returns:**

0 upon success, -1 if an error occurred.

**12.15.2.15** `__extern int caca_set_cursor (caca_display_t * dp, int flag)`

Show or hide the cursor, for devices that support such a feature.

If an error occurs, -1 is returned and **errno** is set accordingly:

- ENOSYS Display driver does not support showing the cursor.

**Parameters:**

*dp* The libcaca display context.

*flag* 0 hides the cursor, 1 shows the system's default cursor (usually a white rectangle). Other values are reserved for future use.

**Returns:**

0 upon success, -1 if an error occurred.

Referenced by `caca_conio__setcursortype()`.

## 12.16 libcaca event handling

**Functions**

- `__extern int caca_get_event (caca_display_t *, int, caca_event_t *, int)`  
*Get the next mouse or keyboard input event.*
- `__extern int caca_get_mouse_x (caca_display_t const *)`  
*Return the X mouse coordinate.*
- `__extern int caca_get_mouse_y (caca_display_t const *)`  
*Return the Y mouse coordinate.*
- `__extern enum caca_event_type caca_get_event_type (caca_event_t const *)`  
*Return an event's type.*
- `__extern int caca_get_event_key_ch (caca_event_t const *)`  
*Return a key press or key release event's value.*
- `__extern uint32_t caca_get_event_key_utf32 (caca_event_t const *)`  
*Return a key press or key release event's Unicode value.*
- `__extern int caca_get_event_key_utf8 (caca_event_t const *, char *)`  
*Return a key press or key release event's UTF-8 value.*
- `__extern int caca_get_event_mouse_button (caca_event_t const *)`  
*Return a mouse press or mouse release event's button.*
- `__extern int caca_get_event_mouse_x (caca_event_t const *)`  
*Return a mouse motion event's X coordinate.*
- `__extern int caca_get_event_mouse_y (caca_event_t const *)`  
*Return a mouse motion event's Y coordinate.*
- `__extern int caca_get_event_resize_width (caca_event_t const *)`  
*Return a resize event's display width value.*
- `__extern int caca_get_event_resize_height (caca_event_t const *)`  
*Return a resize event's display height value.*

### 12.16.1 Detailed Description

These functions handle user events such as keyboard input and mouse clicks.



### 12.16.2 Function Documentation

#### 12.16.2.1 `__extern int caca_get_event (caca_display_t * dp, int event_mask, caca_event_t * ev, int timeout)`

Poll the event queue for mouse or keyboard events matching the event mask and return the first matching event. Non-matching events are discarded. If *event\_mask* is zero, the function returns immediately.

The timeout value tells how long this function needs to wait for an event. A value of zero returns immediately and the function returns zero if no more events are pending in the queue. A negative value causes the function to wait indefinitely until a matching event is received.

If not null, *ev* will be filled with information about the event received. If null, the function will return but no information about the event will be sent.

This function never fails.

##### Parameters:

- dp* The libcaca graphical context.
- event\_mask* Bitmask of requested events.
- timeout* A timeout value in microseconds, -1 for blocking behaviour
- ev* A pointer to a [caca\\_event](#) structure, or NULL.

##### Returns:

- 1 if a matching event was received, or 0 if the wait timed out.

References CACA\_EVENT\_NONE.

Referenced by `caca_conio_getch()`, and `caca_conio_kbhit()`.

#### 12.16.2.2 `__extern int caca_get_mouse_x (caca_display_t const * dp)`

Return the X coordinate of the mouse position last time it was detected. This function is not reliable if the ncurses or S-Lang drivers are being used, because mouse position is only detected when the mouse is clicked. Other drivers such as X11 work well.

This function never fails.

##### Parameters:

- dp* The libcaca graphical context.

##### Returns:

- The X mouse coordinate.

References `caca_get_canvas_width()`.

#### 12.16.2.3 `__extern int caca_get_mouse_y (caca_display_t const * dp)`

Return the Y coordinate of the mouse position last time it was detected. This function is not reliable if the ncurses or S-Lang drivers are being used, because mouse position is only detected when the mouse is clicked. Other drivers such as X11 work well.

This function never fails.

**Parameters:**

*dp* The libcaca graphical context.

**Returns:**

The Y mouse coordinate.

References `caca_get_canvas_height()`.

#### 12.16.2.4 `__extern enum caca_event_type caca_get_event_type (caca_event_t const * ev)`

Return the type of an event. This function may always be called on an event after `caca_get_event()` was called, and its return value indicates which other functions may be called:

- `CACA_EVENT_NONE`: no other function may be called.
- `CACA_EVENT_KEY_PRESS`, `CACA_EVENT_KEY_RELEASE`: `caca_get_event_key_ch()`, `caca_get_event_key_utf32()` and `caca_get_event_key_utf8()` may be called.
- `CACA_EVENT_MOUSE_PRESS`, `CACA_EVENT_MOUSE_RELEASE`: `caca_get_event_mouse_button()` may be called.
- `CACA_EVENT_MOUSE_MOTION`: `caca_get_event_mouse_x()` and `caca_get_event_mouse_y()` may be called.
- `CACA_EVENT_RESIZE`: `caca_get_event_resize_width()` and `caca_get_event_resize_height()` may be called.
- `CACA_EVENT_QUIT`: no other function may be called.

This function never fails.

**Parameters:**

*ev* The libcaca event.

**Returns:**

The event's type.

#### 12.16.2.5 `__extern int caca_get_event_key_ch (caca_event_t const * ev)`

Return either the ASCII value for an event's key, or if the key is not an ASCII character, an appropriate *enum caca\_key* value.

This function never fails, but must only be called with a valid event of type `CACA_EVENT_KEY_PRESS` or `CACA_EVENT_KEY_RELEASE`, or the results will be undefined. See `caca_get_event_type()` for more information.

**Parameters:**

*ev* The libcaca event.

**Returns:**

The key value.

Referenced by `caca_conio_getch()`, and `caca_conio_kbhit()`.

**12.16.2.6 `__extern uint32_t caca_get_event_key_utf32 (caca_event_t const * ev)`**

Return the UTF-32/UCS-4 value for an event's key if it resolves to a printable character.

This function never fails, but must only be called with a valid event of type `CACA_EVENT_KEY_PRESS` or `CACA_EVENT_KEY_RELEASE`, or the results will be undefined. See [caca\\_get\\_event\\_type\(\)](#) for more information.

**Parameters:**

*ev* The libcaca event.

**Returns:**

The key's Unicode value.

**12.16.2.7 `__extern int caca_get_event_key_utf8 (caca_event_t const * ev, char * utf8)`**

Write the UTF-8 value for an event's key if it resolves to a printable character. Up to 6 UTF-8 bytes and a null termination are written.

This function never fails, but must only be called with a valid event of type `CACA_EVENT_KEY_PRESS` or `CACA_EVENT_KEY_RELEASE`, or the results will be undefined. See [caca\\_get\\_event\\_type\(\)](#) for more information.

**Parameters:**

*ev* The libcaca event.

*utf8* A string buffer with enough bytes to hold the pressed key value in UTF-8. Though fewer bytes may be written to it, 7 bytes is the minimum safe size.

**Returns:**

This function always returns 0.

**12.16.2.8 `__extern int caca_get_event_mouse_button (caca_event_t const * ev)`**

Return the mouse button index for an event.

This function never fails, but must only be called with a valid event of type `CACA_EVENT_MOUSE_PRESS` or `CACA_EVENT_MOUSE_RELEASE`, or the results will be undefined. See [caca\\_get\\_event\\_type\(\)](#) for more information.

This function returns 1 for the left mouse button, 2 for the right mouse button, and 3 for the middle mouse button.

**Parameters:**

*ev* The libcaca event.

**Returns:**

The event's mouse button.

**12.16.2.9 `__extern int caca_get_event_mouse_x (caca_event_t const * ev)`**

Return the X coordinate for a mouse motion event.

This function never fails, but must only be called with a valid event of type `CACA_EVENT_MOUSE_MOTION`, or the results will be undefined. See [caca\\_get\\_event\\_type\(\)](#) for more information.

**Parameters:**

*ev* The libcaca event.

**Returns:**

The event's X mouse coordinate.

**12.16.2.10 `__extern int caca_get_event_mouse_y (caca_event_t const * ev)`**

Return the Y coordinate for a mouse motion event.

This function never fails, but must only be called with a valid event of type `CACA_EVENT_MOUSE_MOTION`, or the results will be undefined. See [caca\\_get\\_event\\_type\(\)](#) for more information.

**Parameters:**

*ev* The libcaca event.

**Returns:**

The event's Y mouse coordinate.

**12.16.2.11 `__extern int caca_get_event_resize_width (caca_event_t const * ev)`**

Return the width value for a display resize event.

This function never fails, but must only be called with a valid event of type `CACA_EVENT_RESIZE`, or the results will be undefined. See [caca\\_get\\_event\\_type\(\)](#) for more information.

**Parameters:**

*ev* The libcaca event.

**Returns:**

The event's new display width value.

**12.16.2.12 \_\_extern int caca\_get\_event\_resize\_height (caca\_event\_t const \* ev)**

Return the height value for a display resize event.

This function never fails, but must only be called with a valid event of type CACA\_EVENT\_RESIZE, or the results will be undefined. See [caca\\_get\\_event\\_type\(\)](#) for more information.

**Parameters:**

*ev* The libcaca event.

**Returns:**

The event's new display height value.

**12.17 libcaca DOS conio.h compatibility layer****Functions**

- \_\_extern char \* [caca\\_conio\\_cgets](#) (char \*str)  
*DOS conio.h cgets() equivalent.*
- \_\_extern void [caca\\_conio\\_clreol](#) (void)  
*DOS conio.h clreol() equivalent.*
- \_\_extern void [caca\\_conio\\_clrscr](#) (void)  
*DOS conio.h clrscr() equivalent.*
- \_\_extern int [caca\\_conio\\_cprintf](#) (const char \*format,...)  
*DOS conio.h cprintf() equivalent.*
- \_\_extern int [caca\\_conio\\_cputs](#) (const char \*str)  
*DOS conio.h cputs() equivalent.*
- \_\_extern int [caca\\_conio\\_cscanf](#) (char \*format,...)  
*DOS stdio.h cscanf() equivalent.*
- \_\_extern void [caca\\_conio\\_delay](#) (unsigned int)  
*DOS dos.h delay() equivalent.*
- \_\_extern void [caca\\_conio\\_delline](#) (void)  
*DOS conio.h delline() equivalent.*

- `__extern int caca\_conio\_getch (void)`  
*DOS conio.h getch() equivalent.*
- `__extern int caca\_conio\_getche (void)`  
*DOS conio.h getche() equivalent.*
- `__extern char * caca\_conio\_getpass (const char *prompt)`  
*DOS conio.h getpass() equivalent.*
- `__extern int caca\_conio\_gettext (int left, int top, int right, int bottom, void *destin)`  
*DOS conio.h gettext() equivalent.*
- `__extern void caca\_conio\_gettextinfo (struct caca\_conio\_text\_info *r)`  
*DOS conio.h gettextinfo() equivalent.*
- `__extern void caca\_conio\_gotoxy (int x, int y)`  
*DOS conio.h gotoxy() equivalent.*
- `__extern void caca\_conio\_highvideo (void)`  
*DOS conio.h highvideo() equivalent.*
- `__extern void caca\_conio\_inslne (void)`  
*DOS conio.h inslne() equivalent.*
- `__extern int caca\_conio\_kbhit (void)`  
*DOS conio.h kbhit() equivalent.*
- `__extern void caca\_conio\_lowvideo (void)`  
*DOS conio.h lowvideo() equivalent.*
- `__extern int caca\_conio\_movetext (int left, int top, int right, int bottom, int destleft, int desttop)`  
*DOS conio.h movetext() equivalent.*
- `__extern void caca\_conio\_normvideo (void)`  
*DOS conio.h normvideo() equivalent.*
- `__extern void caca\_conio\_nosound (void)`  
*DOS dos.h nosound() equivalent.*
- `__extern int caca\_conio\_printf (const char *format,...)`  
*DOS stdio.h printf() equivalent.*
- `__extern int caca\_conio\_putch (int ch)`  
*DOS conio.h putch() equivalent.*
- `__extern int caca\_conio\_puttext (int left, int top, int right, int bottom, void *destin)`  
*DOS conio.h puttext() equivalent.*
- `__extern void caca\_conio\_\_setcursortype (int cur_t)`  
*DOS conio.h \_setcursortype() equivalent.*

- `__extern void caca\_conio\_sleep (unsigned int)`  
*DOS `dos.h sleep()` equivalent.*
- `__extern void caca\_conio\_sound (unsigned int)`  
*DOS `dos.h sound()` equivalent.*
- `__extern void caca\_conio\_textattr (int newattr)`  
*DOS `conio.h textattr()` equivalent.*
- `__extern void caca\_conio\_textbackground (int newcolor)`  
*DOS `conio.h textbackground()` equivalent.*
- `__extern void caca\_conio\_textcolor (int newcolor)`  
*DOS `conio.h textcolor()` equivalent.*
- `__extern void caca\_conio\_textmode (int newmode)`  
*DOS `conio.h textmode()` equivalent.*
- `__extern int caca\_conio\_ungetch (int ch)`  
*DOS `conio.h ungetch()` equivalent.*
- `__extern int caca\_conio\_wherex (void)`  
*DOS `conio.h wherex()` equivalent.*
- `__extern int caca\_conio\_wwherey (void)`  
*DOS `conio.h wherey()` equivalent.*
- `__extern void caca\_conio\_window (int left, int top, int right, int bottom)`  
*DOS `conio.h window()` equivalent.*

### 12.17.1 Detailed Description

These functions implement DOS-like functions for high-level text operations.

## 13 Data Structure Documentation

### 13.1 `caca_conio_text_info` Struct Reference

DOS text area information.

#### Data Fields

- unsigned char [winleft](#)
- unsigned char [wintop](#)
- unsigned char [winright](#)
- unsigned char [winbottom](#)

- unsigned char [attribute](#)
- unsigned char [normattr](#)
- unsigned char [currmode](#)
- unsigned char [screenheight](#)
- unsigned char [screenwidth](#)
- unsigned char [curx](#)
- unsigned char [cury](#)

### 13.1.1 Detailed Description

This structure stores text area information for the DOS conio.h compatibility layer.

### 13.1.2 Field Documentation

#### 13.1.2.1 unsigned char caca\_conio\_text\_info::winleft

left window coordinate

#### 13.1.2.2 unsigned char caca\_conio\_text\_info::wintop

top window coordinate

#### 13.1.2.3 unsigned char caca\_conio\_text\_info::winright

right window coordinate

#### 13.1.2.4 unsigned char caca\_conio\_text\_info::winbottom

bottom window coordinate

#### 13.1.2.5 unsigned char caca\_conio\_text\_info::attribute

text attribute

#### 13.1.2.6 unsigned char caca\_conio\_text\_info::normattr

normal attribute



### 13.1.2.7 unsigned char caca\_conio\_text\_info::currmode

current video mode: BW40, BW80, C40, C80, or C4350

### 13.1.2.8 unsigned char caca\_conio\_text\_info::screenheight

text screen's height

### 13.1.2.9 unsigned char caca\_conio\_text\_info::screenwidth

text screen's width

### 13.1.2.10 unsigned char caca\_conio\_text\_info::curx

x-coordinate in current window

### 13.1.2.11 unsigned char caca\_conio\_text\_info::cury

y-coordinate in current window

## 13.2 caca\_event Struct Reference

Handling of user events.

### Data Fields

- enum [caca\\_event\\_type](#) type
- union {
  - struct {
    - int **x**
    - int **y**
    - int **button**
  - } **mouse**
  - struct {
    - int **w**
    - int **h**
  - } **resize**
  - struct {
    - int **ch**
    - uint32\_t **utf32**
    - char **utf8** [8]
  - } **key**

```
} data
```

### 13.2.1 Detailed Description

This structure is filled by `caca_get_event()` when an event is received. It is an opaque structure that should only be accessed through `caca_event_get_type()` and similar functions. The struct members may no longer be directly accessible in future versions.

### 13.2.2 Field Documentation

#### 13.2.2.1 enum `caca_event_type` `caca_event::type`

The event type.

#### 13.2.2.2 union { ... } `caca_event::data`

The event information data

## 14 File Documentation

### 14.1 `caca.h` File Reference

The *libcaca* public header.

#### Data Structures

- struct `caca_event`  
*Handling of user events.*
- struct `caca_conio_text_info`  
*DOS text area information.*

#### Defines

- #define `CACA_API_VERSION_1`
- #define `CACA_MAGIC_FULLWIDTH` 0x000ffffe

#### Typedefs

- typedef struct `caca_canvas` `caca_canvas_t`
- typedef struct `caca_dither` `caca_dither_t`
- typedef struct `caca_font` `caca_font_t`

- typedef struct caca\_file [caca\\_file\\_t](#)
- typedef struct caca\_display [caca\\_display\\_t](#)
- typedef struct [caca\\_event](#) [caca\\_event\\_t](#)

## Enumerations

- enum [caca\\_color](#) {  
    [CACA\\_BLACK](#) = 0x00,  
    [CACA\\_BLUE](#) = 0x01,  
    [CACA\\_GREEN](#) = 0x02,  
    [CACA\\_CYAN](#) = 0x03,  
    [CACA\\_RED](#) = 0x04,  
    [CACA\\_MAGENTA](#) = 0x05,  
    [CACA\\_BROWN](#) = 0x06,  
    [CACA\\_LIGHTGRAY](#) = 0x07,  
    [CACA\\_DARKGRAY](#) = 0x08,  
    [CACA\\_LIGHTBLUE](#) = 0x09,  
    [CACA\\_LIGHTGREEN](#) = 0x0a,  
    [CACA\\_LIGHTCYAN](#) = 0x0b,  
    [CACA\\_LIGHTRED](#) = 0x0c,  
    [CACA\\_LIGHTMAGENTA](#) = 0x0d,  
    [CACA\\_YELLOW](#) = 0x0e,  
    [CACA\\_WHITE](#) = 0x0f,  
    [CACA\\_DEFAULT](#) = 0x10,  
    [CACA\\_TRANSPARENT](#) = 0x20 }  
• enum [caca\\_style](#) {  
    [CACA\\_BOLD](#) = 0x01,  
    [CACA\\_ITALICS](#) = 0x02,  
    [CACA\\_UNDERLINE](#) = 0x04,  
    [CACA\\_BLINK](#) = 0x08 }  
• enum [caca\\_event\\_type](#) {  
    [CACA\\_EVENT\\_NONE](#) = 0x0000,  
    [CACA\\_EVENT\\_KEY\\_PRESS](#) = 0x0001,  
    [CACA\\_EVENT\\_KEY\\_RELEASE](#) = 0x0002,  
    [CACA\\_EVENT\\_MOUSE\\_PRESS](#) = 0x0004,  
    [CACA\\_EVENT\\_MOUSE\\_RELEASE](#) = 0x0008,  
    [CACA\\_EVENT\\_MOUSE\\_MOTION](#) = 0x0010,  
    [CACA\\_EVENT\\_RESIZE](#) = 0x0020,  
    [CACA\\_EVENT\\_QUIT](#) = 0x0040,  
    [CACA\\_EVENT\\_ANY](#) = 0xffff }

*User event type enumeration.*

- enum caca\_key {  
CACA\_KEY\_UNKNOWN = 0x00,  
CACA\_KEY\_CTRL\_A = 0x01,  
CACA\_KEY\_CTRL\_B = 0x02,  
CACA\_KEY\_CTRL\_C = 0x03,  
CACA\_KEY\_CTRL\_D = 0x04,  
CACA\_KEY\_CTRL\_E = 0x05,  
CACA\_KEY\_CTRL\_F = 0x06,  
CACA\_KEY\_CTRL\_G = 0x07,  
CACA\_KEY\_BACKSPACE = 0x08,  
CACA\_KEY\_TAB = 0x09,  
CACA\_KEY\_CTRL\_J = 0x0a,  
CACA\_KEY\_CTRL\_K = 0x0b,  
CACA\_KEY\_CTRL\_L = 0x0c,  
CACA\_KEY\_RETURN = 0x0d,  
CACA\_KEY\_CTRL\_N = 0x0e,  
CACA\_KEY\_CTRL\_O = 0x0f,  
CACA\_KEY\_CTRL\_P = 0x10,  
CACA\_KEY\_CTRL\_Q = 0x11,  
CACA\_KEY\_CTRL\_R = 0x12,  
CACA\_KEY\_PAUSE = 0x13,  
CACA\_KEY\_CTRL\_T = 0x14,  
CACA\_KEY\_CTRL\_U = 0x15,  
CACA\_KEY\_CTRL\_V = 0x16,  
CACA\_KEY\_CTRL\_W = 0x17,  
CACA\_KEY\_CTRL\_X = 0x18,  
CACA\_KEY\_CTRL\_Y = 0x19,  
CACA\_KEY\_CTRL\_Z = 0x1a,  
CACA\_KEY\_ESCAPE = 0x1b,  
CACA\_KEY\_DELETE = 0x7f,  
CACA\_KEY\_UP = 0x111,  
CACA\_KEY\_DOWN = 0x112,  
CACA\_KEY\_LEFT = 0x113,  
CACA\_KEY\_RIGHT = 0x114,  
CACA\_KEY\_INSERT = 0x115,  
CACA\_KEY\_HOME = 0x116,  
CACA\_KEY\_END = 0x117,  
CACA\_KEY\_PAGEUP = 0x118,  
CACA\_KEY\_PAGEDOWN = 0x119,  
CACA\_KEY\_F1 = 0x11a,  
CACA\_KEY\_F2 = 0x11b,

```
CACA_KEY_F3 = 0x11c,  
CACA_KEY_F4 = 0x11d,  
CACA_KEY_F5 = 0x11e,  
CACA_KEY_F6 = 0x11f,  
CACA_KEY_F7 = 0x120,  
CACA_KEY_F8 = 0x121,  
CACA_KEY_F9 = 0x122,  
CACA_KEY_F10 = 0x123,  
CACA_KEY_F11 = 0x124,  
CACA_KEY_F12 = 0x125,  
CACA_KEY_F13 = 0x126,  
CACA_KEY_F14 = 0x127,  
CACA_KEY_F15 = 0x128 }
```

*Special key values.*

- enum **CACA\_CONIO\_COLORS** {  
    **CACA\_CONIO\_BLINK** = 128,  
    **CACA\_CONIO\_BLACK** = 0,  
    **CACA\_CONIO\_BLUE** = 1,  
    **CACA\_CONIO\_GREEN** = 2,  
    **CACA\_CONIO\_CYAN** = 3,  
    **CACA\_CONIO\_RED** = 4,  
    **CACA\_CONIO\_MAGENTA** = 5,  
    **CACA\_CONIO\_BROWN** = 6,  
    **CACA\_CONIO\_LIGHTGRAY** = 7,  
    **CACA\_CONIO\_DARKGRAY** = 8,  
    **CACA\_CONIO\_LIGHTBLUE** = 9,  
    **CACA\_CONIO\_LIGHTGREEN** = 10,  
    **CACA\_CONIO\_LIGHTCYAN** = 11,  
    **CACA\_CONIO\_LIGHTRED** = 12,  
    **CACA\_CONIO\_LIGHTMAGENTA** = 13,  
    **CACA\_CONIO\_YELLOW** = 14,  
    **CACA\_CONIO\_WHITE** = 15 }

*DOS colours.*

- enum **CACA\_CONIO\_CURSOR** {  
    **CACA\_CONIO\_\_NOCURSOR** = 0,  
    **CACA\_CONIO\_\_SOLIDCURSOR** = 1,  
    **CACA\_CONIO\_\_NORMALCURSOR** = 2 }

*DOS cursor modes.*

- enum [CACA\\_CONIO\\_MODE](#) {  
**CACA\_CONIO\_LASTMODE** = -1,  
**CACA\_CONIO\_BW40** = 0,  
**CACA\_CONIO\_C40** = 1,  
**CACA\_CONIO\_BW80** = 2,  
**CACA\_CONIO\_C80** = 3,  
**CACA\_CONIO\_MONO** = 7,  
**CACA\_CONIO\_C4350** = 64 }

*DOS video modes.*

## Functions

- `__extern caca\_canvas\_t * caca\_create\_canvas (int, int)`  
*Initialise a libcaca canvas.*
- `__extern int caca\_manage\_canvas (caca\_canvas\_t *, int(*) (void *), void *)`  
*Manage a canvas.*
- `__extern int caca\_unmanage\_canvas (caca\_canvas\_t *, int(*) (void *), void *)`  
*unmanage a canvas.*
- `__extern int caca\_set\_canvas\_size (caca\_canvas\_t *, int, int)`  
*Resize a canvas.*
- `__extern int caca\_get\_canvas\_width (caca\_canvas\_t const *)`  
*Get the canvas width.*
- `__extern int caca\_get\_canvas\_height (caca\_canvas\_t const *)`  
*Get the canvas height.*
- `__extern uint32_t const * caca\_get\_canvas\_chars (caca\_canvas\_t const *)`  
*Get the canvas character array.*
- `__extern uint32_t const * caca\_get\_canvas\_attrs (caca\_canvas\_t const *)`  
*Get the canvas attribute array.*
- `__extern int caca\_free\_canvas (caca\_canvas\_t *)`  
*Free a libcaca canvas.*
- `__extern int caca\_rand (int, int)`  
*Generate a random integer within a range.*
- `__extern char const * caca\_get\_version (void)`  
*Return the libcaca version.*
- `__extern int caca\_gotoxy (caca\_canvas\_t *, int, int)`  
*Set cursor position.*

- `__extern int caca_wherex (caca_canvas_t const *)`  
*Get X cursor position.*
- `__extern int caca_wherey (caca_canvas_t const *)`  
*Get Y cursor position.*
- `__extern int caca_put_char (caca_canvas_t *, int, int, uint32_t)`  
*Print an ASCII or Unicode character.*
- `__extern uint32_t caca_get_char (caca_canvas_t const *, int, int)`  
*Get the Unicode character at the given coordinates.*
- `__extern int caca_put_str (caca_canvas_t *, int, int, char const *)`  
*Print a string.*
- `__extern int caca_printf (caca_canvas_t *, int, int, char const *,...)`  
*Print a formatted string.*
- `__extern int caca_vprintf (caca_canvas_t *, int, int, char const *, va_list)`  
*Print a formatted string (va\_list version).*
- `__extern int caca_clear_canvas (caca_canvas_t *)`  
*Clear the canvas.*
- `__extern int caca_set_canvas_handle (caca_canvas_t *, int, int)`  
*Set cursor handle.*
- `__extern int caca_get_canvas_handle_x (caca_canvas_t const *)`  
*Get X handle position.*
- `__extern int caca_get_canvas_handle_y (caca_canvas_t const *)`  
*Get Y handle position.*
- `__extern int caca_blit (caca_canvas_t *, int, int, caca_canvas_t const *, caca_canvas_t const *)`  
*Blit a canvas onto another one.*
- `__extern int caca_set_canvas_boundaries (caca_canvas_t *, int, int, int, int)`  
*Set a canvas' new boundaries.*
- `__extern int caca_disable_dirty_rect (caca_canvas_t *)`  
*Disable dirty rectangles.*
- `__extern int caca_enable_dirty_rect (caca_canvas_t *)`  
*Enable dirty rectangles.*
- `__extern int caca_get_dirty_rect_count (caca_canvas_t *)`  
*Get the number of dirty rectangles in the canvas.*
- `__extern int caca_get_dirty_rect (caca_canvas_t *, int, int *, int *, int *, int *)`

*Get a canvas's dirty rectangle.*

- `__extern int caca_add_dirty_rect (caca_canvas_t *, int, int, int, int)`  
*Add an area to the canvas's dirty rectangle list.*
- `__extern int caca_remove_dirty_rect (caca_canvas_t *, int, int, int, int)`  
*Remove an area from the dirty rectangle list.*
- `__extern int caca_clear_dirty_rect_list (caca_canvas_t *)`  
*Clear a canvas's dirty rectangle list.*
- `__extern int caca_invert (caca_canvas_t *)`  
*Invert a canvas' colours.*
- `__extern int caca_flip (caca_canvas_t *)`  
*Flip a canvas horizontally.*
- `__extern int caca_flop (caca_canvas_t *)`  
*Flip a canvas vertically.*
- `__extern int caca_rotate_180 (caca_canvas_t *)`  
*Rotate a canvas.*
- `__extern int caca_rotate_left (caca_canvas_t *)`  
*Rotate a canvas, 90 degrees counterclockwise.*
- `__extern int caca_rotate_right (caca_canvas_t *)`  
*Rotate a canvas, 90 degrees counterclockwise.*
- `__extern int caca_stretch_left (caca_canvas_t *)`  
*Rotate and stretch a canvas, 90 degrees counterclockwise.*
- `__extern int caca_stretch_right (caca_canvas_t *)`  
*Rotate and stretch a canvas, 90 degrees clockwise.*
- `__extern uint32_t caca_get_attr (caca_canvas_t const *, int, int)`  
*Get the text attribute at the given coordinates.*
- `__extern int caca_set_attr (caca_canvas_t *, uint32_t)`  
*Set the default character attribute.*
- `__extern int caca_unset_attr (caca_canvas_t *, uint32_t)`  
*Unset flags in the default character attribute.*
- `__extern int caca_toggle_attr (caca_canvas_t *, uint32_t)`  
*Toggle flags in the default character attribute.*
- `__extern int caca_put_attr (caca_canvas_t *, int, int, uint32_t)`  
*Set the character attribute at the given coordinates.*



- `__extern int caca_set_color_ansi (caca_canvas_t *, uint8_t, uint8_t)`  
*Set the default colour pair for text (ANSI version).*
- `__extern int caca_set_color_argb (caca_canvas_t *, uint16_t, uint16_t)`  
*Set the default colour pair for text (truecolor version).*
- `__extern uint8_t caca_attr_to_ansi (uint32_t)`  
*Get DOS ANSI information from attribute.*
- `__extern uint8_t caca_attr_to_ansi_fg (uint32_t)`  
*Get ANSI foreground information from attribute.*
- `__extern uint8_t caca_attr_to_ansi_bg (uint32_t)`  
*Get ANSI background information from attribute.*
- `__extern uint16_t caca_attr_to_rgb12_fg (uint32_t)`  
*Get 12-bit RGB foreground information from attribute.*
- `__extern uint16_t caca_attr_to_rgb12_bg (uint32_t)`  
*Get 12-bit RGB background information from attribute.*
- `__extern void caca_attr_to_argb64 (uint32_t, uint8_t[8])`  
*Get 64-bit ARGB information from attribute.*
- `__extern uint32_t caca_utf8_to_utf32 (char const *, size_t *)`  
*Convert a UTF-8 character to UTF-32.*
- `__extern size_t caca_utf32_to_utf8 (char *, uint32_t)`  
*Convert a UTF-32 character to UTF-8.*
- `__extern uint8_t caca_utf32_to_cp437 (uint32_t)`  
*Convert a UTF-32 character to CP437.*
- `__extern uint32_t caca_cp437_to_utf32 (uint8_t)`  
*Convert a CP437 character to UTF-32.*
- `__extern char caca_utf32_to_ascii (uint32_t)`  
*Convert a UTF-32 character to ASCII.*
- `__extern int caca_utf32_is_fullwidth (uint32_t)`  
*Tell whether a UTF-32 character is fullwidth.*
- `__extern int caca_draw_line (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Draw a line on the canvas using the given character.*
- `__extern int caca_draw_polyline (caca_canvas_t *, int const x[], int const y[], int, uint32_t)`  
*Draw a polyline.*
- `__extern int caca_draw_thin_line (caca_canvas_t *, int, int, int, int)`  
*Draw a thin line on the canvas, using ASCII art.*

- `__extern int caca_draw_thin_polyline (caca_canvas_t *, int const x[ ], int const y[ ], int)`  
*Draw an ASCII art thin polyline.*
- `__extern int caca_draw_circle (caca_canvas_t *, int, int, int, uint32_t)`  
*Draw a circle on the canvas using the given character.*
- `__extern int caca_draw_ellipse (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Draw an ellipse on the canvas using the given character.*
- `__extern int caca_draw_thin_ellipse (caca_canvas_t *, int, int, int, int)`  
*Draw a thin ellipse on the canvas.*
- `__extern int caca_fill_ellipse (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Fill an ellipse on the canvas using the given character.*
- `__extern int caca_draw_box (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Draw a box on the canvas using the given character.*
- `__extern int caca_draw_thin_box (caca_canvas_t *, int, int, int, int)`  
*Draw a thin box on the canvas.*
- `__extern int caca_draw_cp437_box (caca_canvas_t *, int, int, int, int)`  
*Draw a box on the canvas using CP437 characters.*
- `__extern int caca_fill_box (caca_canvas_t *, int, int, int, int, uint32_t)`  
*Fill a box on the canvas using the given character.*
- `__extern int caca_draw_triangle (caca_canvas_t *, int, int, int, int, int, int, uint32_t)`  
*Draw a triangle on the canvas using the given character.*
- `__extern int caca_draw_thin_triangle (caca_canvas_t *, int, int, int, int, int, int)`  
*Draw a thin triangle on the canvas.*
- `__extern int caca_fill_triangle (caca_canvas_t *, int, int, int, int, int, int, uint32_t)`  
*Fill a triangle on the canvas using the given character.*
- `__extern int caca_fill_triangle_textured (caca_canvas_t *cv, int coords[6], caca_canvas_t *tex, float uv[6])`  
*Fill a triangle on the canvas using an arbitrary-sized texture.*
- `__extern int caca_get_frame_count (caca_canvas_t const *)`  
*Get the number of frames in a canvas.*
- `__extern int caca_set_frame (caca_canvas_t *, int)`  
*Activate a given canvas frame.*
- `__extern char const * caca_get_frame_name (caca_canvas_t const *)`  
*Get the current frame's name.*

- `__extern int caca_set_frame_name (caca_canvas_t *, char const *)`  
*Set the current frame's name.*
- `__extern int caca_create_frame (caca_canvas_t *, int)`  
*Add a frame to a canvas.*
- `__extern int caca_free_frame (caca_canvas_t *, int)`  
*Remove a frame from a canvas.*
- `__extern caca_dither_t * caca_create_dither (int, int, int, int, uint32_t, uint32_t, uint32_t, uint32_t)`  
*Create an internal dither object.*
- `__extern int caca_set_dither_palette (caca_dither_t *, uint32_t r[], uint32_t g[], uint32_t b[], uint32_t a[])`  
*Set the palette of an 8bpp dither object.*
- `__extern int caca_set_dither_brightness (caca_dither_t *, float)`  
*Set the brightness of a dither object.*
- `__extern float caca_get_dither_brightness (caca_dither_t const *)`  
*Get the brightness of a dither object.*
- `__extern int caca_set_dither_gamma (caca_dither_t *, float)`  
*Set the gamma of a dither object.*
- `__extern float caca_get_dither_gamma (caca_dither_t const *)`  
*Get the gamma of a dither object.*
- `__extern int caca_set_dither_contrast (caca_dither_t *, float)`  
*Set the contrast of a dither object.*
- `__extern float caca_get_dither_contrast (caca_dither_t const *)`  
*Get the contrast of a dither object.*
- `__extern int caca_set_dither_antialias (caca_dither_t *, char const *)`  
*Set dither antialiasing.*
- `__extern char const *const * caca_get_dither_antialias_list (caca_dither_t const *)`  
*Get available antialiasing methods.*
- `__extern char const * caca_get_dither_antialias (caca_dither_t const *)`  
*Get current antialiasing method.*
- `__extern int caca_set_dither_color (caca_dither_t *, char const *)`  
*Choose colours used for dithering.*
- `__extern char const *const * caca_get_dither_color_list (caca_dither_t const *)`  
*Get available colour modes.*
- `__extern char const * caca_get_dither_color (caca_dither_t const *)`

*Get current colour mode.*

- `__extern int caca_set_dither_charset (caca_dither_t *, char const *)`  
*Choose characters used for dithering.*
- `__extern char const *const * caca_get_dither_charset_list (caca_dither_t const *)`  
*Get available dither character sets.*
- `__extern char const * caca_get_dither_charset (caca_dither_t const *)`  
*Get current character set.*
- `__extern int caca_set_dither_algorithm (caca_dither_t *, char const *)`  
*Set dithering algorithm.*
- `__extern char const *const * caca_get_dither_algorithm_list (caca_dither_t const *)`  
*Get dithering algorithms.*
- `__extern char const * caca_get_dither_algorithm (caca_dither_t const *)`  
*Get current dithering algorithm.*
- `__extern int caca_dither_bitmap (caca_canvas_t *, int, int, int, int, caca_dither_t const *, void const *)`  
*Dither a bitmap on the canvas.*
- `__extern int caca_free_dither (caca_dither_t *)`  
*Free the memory associated with a dither.*
- `__extern caca_font_t * caca_load_font (void const *, size_t)`  
*Load a font from memory for future use.*
- `__extern char const *const * caca_get_font_list (void)`  
*Get available builtin fonts.*
- `__extern int caca_get_font_width (caca_font_t const *)`  
*Get a font's standard glyph width.*
- `__extern int caca_get_font_height (caca_font_t const *)`  
*Get a font's standard glyph height.*
- `__extern uint32_t const * caca_get_font_blocks (caca_font_t const *)`  
*Get a font's list of supported glyphs.*
- `__extern int caca_render_canvas (caca_canvas_t const *, caca_font_t const *, void *, int, int, int)`  
*Render the canvas onto an image buffer.*
- `__extern int caca_free_font (caca_font_t *)`  
*Free a font structure.*
- `__extern int caca_canvas_set_figfont (caca_canvas_t *, char const *)`  
*load a figfont and attach it to a canvas*

- `__extern int caca_put_figchar (caca_canvas_t *, uint32_t)`  
*paste a character using the current figfont*
- `__extern int caca_flush_figlet (caca_canvas_t *)`  
*flush the figlet context*
- `__extern caca_file_t * caca_file_open (char const *, const char *)`  
*Open a file for reading or writing.*
- `__extern int caca_file_close (caca_file_t *)`  
*Close a file handle.*
- `__extern uint64_t caca_file_tell (caca_file_t *)`  
*Return the position in a file handle.*
- `__extern size_t caca_file_read (caca_file_t *, void *, size_t)`  
*Read data from a file handle.*
- `__extern size_t caca_file_write (caca_file_t *, const void *, size_t)`  
*Write data to a file handle.*
- `__extern char * caca_file_gets (caca_file_t *, char *, int)`  
*Read a line from a file handle.*
- `__extern int caca_file_eof (caca_file_t *)`  
*Tell whether a file handle reached end of file.*
- `__extern ssize_t caca_import_canvas_from_memory (caca_canvas_t *, void const *, size_t, char const *)`  
*Import a memory buffer into a canvas.*
- `__extern ssize_t caca_import_canvas_from_file (caca_canvas_t *, char const *, char const *)`  
*Import a file into a canvas.*
- `__extern ssize_t caca_import_area_from_memory (caca_canvas_t *, int, int, void const *, size_t, char const *)`  
*Import a memory buffer into a canvas area.*
- `__extern ssize_t caca_import_area_from_file (caca_canvas_t *, int, int, char const *, char const *)`  
*Import a file into a canvas area.*
- `__extern char const *const * caca_get_import_list (void)`  
*Get available import formats.*
- `__extern void * caca_export_canvas_to_memory (caca_canvas_t const *, char const *, size_t *)`  
*Export a canvas into a foreign format.*
- `__extern void * caca_export_area_to_memory (caca_canvas_t const *, int, int, int, int, char const *, size_t *)`

*Export a canvas portion into a foreign format.*

- `__extern char const *const * caca_get_export_list (void)`  
*Get available export formats.*
- `__extern caca_display_t * caca_create_display (caca_canvas_t *)`  
*Attach a caca graphical context to a caca canvas.*
- `__extern caca_display_t * caca_create_display_with_driver (caca_canvas_t *, char const *)`  
*Attach a specific caca graphical context to a caca canvas.*
- `__extern char const *const * caca_get_display_driver_list (void)`  
*Get available display drivers.*
- `__extern char const * caca_get_display_driver (caca_display_t *)`  
*Return a caca graphical context's current output driver.*
- `__extern int caca_set_display_driver (caca_display_t *, char const *)`  
*Set the output driver.*
- `__extern int caca_free_display (caca_display_t *)`  
*Detach a caca graphical context from a caca backend context.*
- `__extern caca_canvas_t * caca_get_canvas (caca_display_t *)`  
*Get the canvas attached to a caca graphical context.*
- `__extern int caca_refresh_display (caca_display_t *)`  
*Flush pending changes and redraw the screen.*
- `__extern int caca_set_display_time (caca_display_t *, int)`  
*Set the refresh delay.*
- `__extern int caca_get_display_time (caca_display_t const *)`  
*Get the display's average rendering time.*
- `__extern int caca_get_display_width (caca_display_t const *)`  
*Get the display width.*
- `__extern int caca_get_display_height (caca_display_t const *)`  
*Get the display height.*
- `__extern int caca_set_display_title (caca_display_t *, char const *)`  
*Set the display title.*
- `__extern int caca_set_mouse (caca_display_t *, int)`  
*Show or hide the mouse pointer.*
- `__extern int caca_set_cursor (caca_display_t *, int)`  
*Show or hide the cursor.*

- `__extern int caca_get_event (caca_display_t *, int, caca_event_t *, int)`  
*Get the next mouse or keyboard input event.*
- `__extern int caca_get_mouse_x (caca_display_t const *)`  
*Return the X mouse coordinate.*
- `__extern int caca_get_mouse_y (caca_display_t const *)`  
*Return the Y mouse coordinate.*
- `__extern enum caca_event_type caca_get_event_type (caca_event_t const *)`  
*Return an event's type.*
- `__extern int caca_get_event_key_ch (caca_event_t const *)`  
*Return a key press or key release event's value.*
- `__extern uint32_t caca_get_event_key_utf32 (caca_event_t const *)`  
*Return a key press or key release event's Unicode value.*
- `__extern int caca_get_event_key_utf8 (caca_event_t const *, char *)`  
*Return a key press or key release event's UTF-8 value.*
- `__extern int caca_get_event_mouse_button (caca_event_t const *)`  
*Return a mouse press or mouse release event's button.*
- `__extern int caca_get_event_mouse_x (caca_event_t const *)`  
*Return a mouse motion event's X coordinate.*
- `__extern int caca_get_event_mouse_y (caca_event_t const *)`  
*Return a mouse motion event's Y coordinate.*
- `__extern int caca_get_event_resize_width (caca_event_t const *)`  
*Return a resize event's display width value.*
- `__extern int caca_get_event_resize_height (caca_event_t const *)`  
*Return a resize event's display height value.*
- `__extern char * caca_conio_cgets (char *str)`  
*DOS conio.h cgets() equivalent.*
- `__extern void caca_conio_clreol (void)`  
*DOS conio.h clreol() equivalent.*
- `__extern void caca_conio_clrscr (void)`  
*DOS conio.h clrscr() equivalent.*
- `__extern int caca_conio_cprintf (const char *format,...)`  
*DOS conio.h cprintf() equivalent.*
- `__extern int caca_conio_cputs (const char *str)`  
*DOS conio.h cputs() equivalent.*

- `__extern int caca_conio_cscanf` (char \*format,...)  
*DOS stdio.h cscanf() equivalent.*
- `__extern void caca_conio_delay` (unsigned int)  
*DOS dos.h delay() equivalent.*
- `__extern void caca_conio_delline` (void)  
*DOS conio.h delline() equivalent.*
- `__extern int caca_conio_getch` (void)  
*DOS conio.h getch() equivalent.*
- `__extern int caca_conio_getche` (void)  
*DOS conio.h getche() equivalent.*
- `__extern char * caca_conio_getpass` (const char \*prompt)  
*DOS conio.h getpass() equivalent.*
- `__extern int caca_conio_gettext` (int left, int top, int right, int bottom, void \*destin)  
*DOS conio.h gettext() equivalent.*
- `__extern void caca_conio_gettextinfo` (struct caca\_conio\_text\_info \*r)  
*DOS conio.h gettextinfo() equivalent.*
- `__extern void caca_conio_gotoxy` (int x, int y)  
*DOS conio.h gotoxy() equivalent.*
- `__extern void caca_conio_highvideo` (void)  
*DOS conio.h highvideo() equivalent.*
- `__extern void caca_conio_inslin` (void)  
*DOS conio.h inslin() equivalent.*
- `__extern int caca_conio_kbhit` (void)  
*DOS conio.h kbhit() equivalent.*
- `__extern void caca_conio_lowvideo` (void)  
*DOS conio.h lowvideo() equivalent.*
- `__extern int caca_conio_movetext` (int left, int top, int right, int bottom, int destleft, int desttop)  
*DOS conio.h movetext() equivalent.*
- `__extern void caca_conio_normvideo` (void)  
*DOS conio.h normvideo() equivalent.*
- `__extern void caca_conio_nosound` (void)  
*DOS dos.h nosound() equivalent.*
- `__extern int caca_conio_printf` (const char \*format,...)



*DOS stdio.h printf() equivalent.*

- `__extern int caca_conio_putch` (int ch)  
*DOS conio.h putch() equivalent.*
- `__extern int caca_conio_puttext` (int left, int top, int right, int bottom, void \*destin)  
*DOS conio.h puttext() equivalent.*
- `__extern void caca_conio__setcursortype` (int cur\_t)  
*DOS conio.h \_setcursortype() equivalent.*
- `__extern void caca_conio_sleep` (unsigned int)  
*DOS dos.h sleep() equivalent.*
- `__extern void caca_conio_sound` (unsigned int)  
*DOS dos.h sound() equivalent.*
- `__extern void caca_conio_textattr` (int newattr)  
*DOS conio.h textattr() equivalent.*
- `__extern void caca_conio_textbackground` (int newcolor)  
*DOS conio.h textbackground() equivalent.*
- `__extern void caca_conio_textcolor` (int newcolor)  
*DOS conio.h textcolor() equivalent.*
- `__extern void caca_conio_textmode` (int newmode)  
*DOS conio.h textmode() equivalent.*
- `__extern int caca_conio_ungetch` (int ch)  
*DOS conio.h ungetch() equivalent.*
- `__extern int caca_conio_wherex` (void)  
*DOS conio.h wherex() equivalent.*
- `__extern int caca_conio_wherey` (void)  
*DOS conio.h wherey() equivalent.*
- `__extern void caca_conio_window` (int left, int top, int right, int bottom)  
*DOS conio.h window() equivalent.*

### Variables

- `__extern int caca_conio_directvideo`  
*DOS direct video control.*
- `__extern int caca_conio__wscroll`  
*DOS scrolling control.*

### 14.1.1 Detailed Description

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Sam Hocevar <[sam@hocevar.net](mailto:sam@hocevar.net)> This header contains the public types and functions that applications using *libcaca* may use.

### 14.1.2 Define Documentation

#### 14.1.2.1 #define CACA\_API\_VERSION\_1

*libcaca* API version

### 14.1.3 Typedef Documentation

#### 14.1.3.1 typedef struct caca\_canvas caca\_canvas\_t

*libcaca* canvas

#### 14.1.3.2 typedef struct caca\_dither caca\_dither\_t

dither structure

#### 14.1.3.3 typedef struct caca\_font caca\_font\_t

font structure

#### 14.1.3.4 typedef struct caca\_file caca\_file\_t

file handle structure

#### 14.1.3.5 typedef struct caca\_display caca\_display\_t

*libcaca* display context

#### 14.1.3.6 typedef struct caca\_event caca\_event\_t

*libcaca* event structure

### 14.1.4 Enumeration Type Documentation

#### 14.1.4.1 enum caca\_event\_type

This enum serves two purposes:

- Build listening masks for [caca\\_get\\_event\(\)](#).
- Define the type of a *caca\_event\_t*.

**Enumerator:**

*CACA\_EVENT\_NONE* No event.  
*CACA\_EVENT\_KEY\_PRESS* A key was pressed.  
*CACA\_EVENT\_KEY\_RELEASE* A key was released.  
*CACA\_EVENT\_MOUSE\_PRESS* A mouse button was pressed.  
*CACA\_EVENT\_MOUSE\_RELEASE* A mouse button was released.  
*CACA\_EVENT\_MOUSE\_MOTION* The mouse was moved.  
*CACA\_EVENT\_RESIZE* The window was resized.  
*CACA\_EVENT\_QUIT* The user requested to quit.  
*CACA\_EVENT\_ANY* Bitmask for any event.

#### 14.1.4.2 enum caca\_key

Special key values returned by [caca\\_get\\_event\(\)](#) for which there is no printable ASCII equivalent.

**Enumerator:**

*CACA\_KEY\_UNKNOWN* Unknown key.  
*CACA\_KEY\_CTRL\_A* The Ctrl-A key.  
*CACA\_KEY\_CTRL\_B* The Ctrl-B key.  
*CACA\_KEY\_CTRL\_C* The Ctrl-C key.  
*CACA\_KEY\_CTRL\_D* The Ctrl-D key.  
*CACA\_KEY\_CTRL\_E* The Ctrl-E key.  
*CACA\_KEY\_CTRL\_F* The Ctrl-F key.  
*CACA\_KEY\_CTRL\_G* The Ctrl-G key.  
*CACA\_KEY\_BACKSPACE* The backspace key.  
*CACA\_KEY\_TAB* The tabulation key.  
*CACA\_KEY\_CTRL\_J* The Ctrl-J key.  
*CACA\_KEY\_CTRL\_K* The Ctrl-K key.  
*CACA\_KEY\_CTRL\_L* The Ctrl-L key.  
*CACA\_KEY\_RETURN* The return key.  
*CACA\_KEY\_CTRL\_N* The Ctrl-N key.

***CACA\_KEY\_CTRL\_O*** The Ctrl-O key.  
***CACA\_KEY\_CTRL\_P*** The Ctrl-P key.  
***CACA\_KEY\_CTRL\_Q*** The Ctrl-Q key.  
***CACA\_KEY\_CTRL\_R*** The Ctrl-R key.  
***CACA\_KEY\_PAUSE*** The pause key.  
***CACA\_KEY\_CTRL\_T*** The Ctrl-T key.  
***CACA\_KEY\_CTRL\_U*** The Ctrl-U key.  
***CACA\_KEY\_CTRL\_V*** The Ctrl-V key.  
***CACA\_KEY\_CTRL\_W*** The Ctrl-W key.  
***CACA\_KEY\_CTRL\_X*** The Ctrl-X key.  
***CACA\_KEY\_CTRL\_Y*** The Ctrl-Y key.  
***CACA\_KEY\_CTRL\_Z*** The Ctrl-Z key.  
***CACA\_KEY\_ESCAPE*** The escape key.  
***CACA\_KEY\_DELETE*** The delete key.  
***CACA\_KEY\_UP*** The up arrow key.  
***CACA\_KEY\_DOWN*** The down arrow key.  
***CACA\_KEY\_LEFT*** The left arrow key.  
***CACA\_KEY\_RIGHT*** The right arrow key.  
***CACA\_KEY\_INSERT*** The insert key.  
***CACA\_KEY\_HOME*** The home key.  
***CACA\_KEY\_END*** The end key.  
***CACA\_KEY\_PAGEUP*** The page up key.  
***CACA\_KEY\_PAGEDOWN*** The page down key.  
***CACA\_KEY\_F1*** The F1 key.  
***CACA\_KEY\_F2*** The F2 key.  
***CACA\_KEY\_F3*** The F3 key.  
***CACA\_KEY\_F4*** The F4 key.  
***CACA\_KEY\_F5*** The F5 key.  
***CACA\_KEY\_F6*** The F6 key.  
***CACA\_KEY\_F7*** The F7 key.  
***CACA\_KEY\_F8*** The F8 key.  
***CACA\_KEY\_F9*** The F9 key.  
***CACA\_KEY\_F10*** The F10 key.  
***CACA\_KEY\_F11*** The F11 key.  
***CACA\_KEY\_F12*** The F12 key.  
***CACA\_KEY\_F13*** The F13 key.  
***CACA\_KEY\_F14*** The F14 key.  
***CACA\_KEY\_F15*** The F15 key.

#### 14.1.4.3 enum CACA\_CONIO\_COLORS

This enum lists the colour values for the DOS conio.h compatibility layer.

#### 14.1.4.4 enum CACA\_CONIO\_CURSOR

This enum lists the cursor mode values for the DOS conio.h compatibility layer.

#### 14.1.4.5 enum CACA\_CONIO\_MODE

This enum lists the video mode values for the DOS conio.h compatibility layer.

## Index

### attribute

caca\_conio\_text\_info, [99](#)

### caca.h, [101](#)

CACA\_EVENT\_ANY, [118](#)  
CACA\_EVENT\_KEY\_PRESS, [118](#)  
CACA\_EVENT\_KEY\_RELEASE, [118](#)  
CACA\_EVENT\_MOUSE\_MOTION, [118](#)  
CACA\_EVENT\_MOUSE\_PRESS, [118](#)  
CACA\_EVENT\_MOUSE\_RELEASE, [118](#)  
CACA\_EVENT\_NONE, [118](#)  
CACA\_EVENT\_QUIT, [118](#)  
CACA\_EVENT\_RESIZE, [118](#)  
CACA\_KEY\_BACKSPACE, [118](#)  
CACA\_KEY\_CTRL\_A, [118](#)  
CACA\_KEY\_CTRL\_B, [118](#)  
CACA\_KEY\_CTRL\_C, [118](#)  
CACA\_KEY\_CTRL\_D, [118](#)  
CACA\_KEY\_CTRL\_E, [118](#)  
CACA\_KEY\_CTRL\_F, [118](#)  
CACA\_KEY\_CTRL\_G, [118](#)  
CACA\_KEY\_CTRL\_J, [118](#)  
CACA\_KEY\_CTRL\_K, [118](#)  
CACA\_KEY\_CTRL\_L, [118](#)  
CACA\_KEY\_CTRL\_N, [118](#)  
CACA\_KEY\_CTRL\_O, [118](#)  
CACA\_KEY\_CTRL\_P, [119](#)  
CACA\_KEY\_CTRL\_Q, [119](#)  
CACA\_KEY\_CTRL\_R, [119](#)  
CACA\_KEY\_CTRL\_T, [119](#)  
CACA\_KEY\_CTRL\_U, [119](#)  
CACA\_KEY\_CTRL\_V, [119](#)  
CACA\_KEY\_CTRL\_W, [119](#)  
CACA\_KEY\_CTRL\_X, [119](#)  
CACA\_KEY\_CTRL\_Y, [119](#)  
CACA\_KEY\_CTRL\_Z, [119](#)  
CACA\_KEY\_DELETE, [119](#)  
CACA\_KEY\_DOWN, [119](#)  
CACA\_KEY\_END, [119](#)  
CACA\_KEY\_ESCAPE, [119](#)  
CACA\_KEY\_F1, [119](#)  
CACA\_KEY\_F10, [119](#)  
CACA\_KEY\_F11, [119](#)  
CACA\_KEY\_F12, [119](#)  
CACA\_KEY\_F13, [119](#)  
CACA\_KEY\_F14, [119](#)  
CACA\_KEY\_F15, [119](#)  
CACA\_KEY\_F2, [119](#)  
CACA\_KEY\_F3, [119](#)  
CACA\_KEY\_F4, [119](#)  
CACA\_KEY\_F5, [119](#)

CACA\_KEY\_F6, [119](#)  
CACA\_KEY\_F7, [119](#)  
CACA\_KEY\_F8, [119](#)  
CACA\_KEY\_F9, [119](#)  
CACA\_KEY\_HOME, [119](#)  
CACA\_KEY\_INSERT, [119](#)  
CACA\_KEY\_LEFT, [119](#)  
CACA\_KEY\_PAGEDOWN, [119](#)  
CACA\_KEY\_PAGEUP, [119](#)  
CACA\_KEY\_PAUSE, [119](#)  
CACA\_KEY\_RETURN, [118](#)  
CACA\_KEY\_RIGHT, [119](#)  
CACA\_KEY\_TAB, [118](#)  
CACA\_KEY\_UNKNOWN, [118](#)  
CACA\_KEY\_UP, [119](#)  
CACA\_API\_VERSION\_1, [117](#)  
caca\_canvas\_t, [117](#)  
CACA\_CONIO\_COLORS, [119](#)  
CACA\_CONIO\_CURSOR, [120](#)  
CACA\_CONIO\_MODE, [120](#)  
caca\_display\_t, [117](#)  
caca\_dither\_t, [117](#)  
caca\_event\_t, [117](#)  
caca\_event\_type, [118](#)  
caca\_file\_t, [117](#)  
caca\_font\_t, [117](#)  
caca\_key, [118](#)

### caca\_attr

CACA\_BLACK, [21](#)  
CACA\_BLINK, [22](#)  
CACA\_BLUE, [21](#)  
CACA\_BOLD, [22](#)  
CACA\_BROWN, [21](#)  
CACA\_CYAN, [21](#)  
CACA\_DARKGRAY, [22](#)  
CACA\_DEFAULT, [22](#)  
CACA\_GREEN, [21](#)  
CACA\_ITALICS, [22](#)  
CACA\_LIGHTBLUE, [22](#)  
CACA\_LIGHTCYAN, [22](#)  
CACA\_LIGHTGRAY, [21](#)  
CACA\_LIGHTGREEN, [22](#)  
CACA\_LIGHTMAGENTA, [22](#)  
CACA\_LIGHTRED, [22](#)  
CACA\_MAGENTA, [21](#)  
CACA\_RED, [21](#)  
CACA\_TRANSPARENT, [22](#)  
CACA\_UNDERLINE, [22](#)  
CACA\_WHITE, [22](#)  
CACA\_YELLOW, [22](#)

CACA\_BLACK  
  caca\_attr, 21

CACA\_BLINK  
  caca\_attr, 22

CACA\_BLUE  
  caca\_attr, 21

CACA\_BOLD  
  caca\_attr, 22

CACA\_BROWN  
  caca\_attr, 21

CACA\_CYAN  
  caca\_attr, 21

CACA\_DARKGRAY  
  caca\_attr, 22

CACA\_DEFAULT  
  caca\_attr, 22

CACA\_EVENT\_ANY  
  caca.h, 118

CACA\_EVENT\_KEY\_PRESS  
  caca.h, 118

CACA\_EVENT\_KEY\_RELEASE  
  caca.h, 118

CACA\_EVENT\_MOUSE\_MOTION  
  caca.h, 118

CACA\_EVENT\_MOUSE\_PRESS  
  caca.h, 118

CACA\_EVENT\_MOUSE\_RELEASE  
  caca.h, 118

CACA\_EVENT\_NONE  
  caca.h, 118

CACA\_EVENT\_QUIT  
  caca.h, 118

CACA\_EVENT\_RESIZE  
  caca.h, 118

CACA\_GREEN  
  caca\_attr, 21

CACA\_ITALICS  
  caca\_attr, 22

CACA\_KEY\_BACKSPACE  
  caca.h, 118

CACA\_KEY\_CTRL\_A  
  caca.h, 118

CACA\_KEY\_CTRL\_B  
  caca.h, 118

CACA\_KEY\_CTRL\_C  
  caca.h, 118

CACA\_KEY\_CTRL\_D  
  caca.h, 118

CACA\_KEY\_CTRL\_E  
  caca.h, 118

CACA\_KEY\_CTRL\_F  
  caca.h, 118

CACA\_KEY\_CTRL\_G  
  caca.h, 118

CACA\_KEY\_CTRL\_J  
  caca.h, 118

CACA\_KEY\_CTRL\_K  
  caca.h, 118

CACA\_KEY\_CTRL\_L  
  caca.h, 118

CACA\_KEY\_CTRL\_N  
  caca.h, 118

CACA\_KEY\_CTRL\_O  
  caca.h, 118

CACA\_KEY\_CTRL\_P  
  caca.h, 119

CACA\_KEY\_CTRL\_Q  
  caca.h, 119

CACA\_KEY\_CTRL\_R  
  caca.h, 119

CACA\_KEY\_CTRL\_T  
  caca.h, 119

CACA\_KEY\_CTRL\_U  
  caca.h, 119

CACA\_KEY\_CTRL\_V  
  caca.h, 119

CACA\_KEY\_CTRL\_W  
  caca.h, 119

CACA\_KEY\_CTRL\_X  
  caca.h, 119

CACA\_KEY\_CTRL\_Y  
  caca.h, 119

CACA\_KEY\_CTRL\_Z  
  caca.h, 119

CACA\_KEY\_DELETE  
  caca.h, 119

CACA\_KEY\_DOWN  
  caca.h, 119

CACA\_KEY\_END  
  caca.h, 119

CACA\_KEY\_ESCAPE  
  caca.h, 119

CACA\_KEY\_F1  
  caca.h, 119

CACA\_KEY\_F10  
  caca.h, 119

CACA\_KEY\_F11  
  caca.h, 119

CACA\_KEY\_F12  
  caca.h, 119

CACA\_KEY\_F13  
  caca.h, 119

CACA\_KEY\_F14  
  caca.h, 119

CACA\_KEY\_F15  
  caca.h, 119

CACA\_KEY\_F2  
  caca.h, 119

- CACA\_KEY\_F3
  - caca.h, [119](#)
- CACA\_KEY\_F4
  - caca.h, [119](#)
- CACA\_KEY\_F5
  - caca.h, [119](#)
- CACA\_KEY\_F6
  - caca.h, [119](#)
- CACA\_KEY\_F7
  - caca.h, [119](#)
- CACA\_KEY\_F8
  - caca.h, [119](#)
- CACA\_KEY\_F9
  - caca.h, [119](#)
- CACA\_KEY\_HOME
  - caca.h, [119](#)
- CACA\_KEY\_INSERT
  - caca.h, [119](#)
- CACA\_KEY\_LEFT
  - caca.h, [119](#)
- CACA\_KEY\_PAGEDOWN
  - caca.h, [119](#)
- CACA\_KEY\_PAGEUP
  - caca.h, [119](#)
- CACA\_KEY\_PAUSE
  - caca.h, [119](#)
- CACA\_KEY\_RETURN
  - caca.h, [118](#)
- CACA\_KEY\_RIGHT
  - caca.h, [119](#)
- CACA\_KEY\_TAB
  - caca.h, [118](#)
- CACA\_KEY\_UNKNOWN
  - caca.h, [118](#)
- CACA\_KEY\_UP
  - caca.h, [119](#)
- CACA\_LIGHTBLUE
  - caca\_attr, [22](#)
- CACA\_LIGHTCYAN
  - caca\_attr, [22](#)
- CACA\_LIGHTGRAY
  - caca\_attr, [21](#)
- CACA\_LIGHTGREEN
  - caca\_attr, [22](#)
- CACA\_LIGHTMAGENTA
  - caca\_attr, [22](#)
- CACA\_LIGHTRED
  - caca\_attr, [22](#)
- CACA\_MAGENTA
  - caca\_attr, [21](#)
- CACA\_RED
  - caca\_attr, [21](#)
- CACA\_TRANSPARENT
  - caca\_attr, [22](#)
- CACA\_UNDERLINE
  - caca\_attr, [22](#)
- CACA\_WHITE
  - caca\_attr, [22](#)
- CACA\_YELLOW
  - caca\_attr, [22](#)
- caca\_add\_dirty\_rect
  - caca\_dirty, [36](#)
- CACA\_API\_VERSION\_1
  - caca.h, [117](#)
- caca\_attr
  - caca\_color, [21](#)
  - caca\_style, [22](#)
- caca\_attr\_to\_ansi
  - caca\_attributes, [46](#)
- caca\_attr\_to\_ansi\_bg
  - caca\_attributes, [47](#)
- caca\_attr\_to\_ansi\_fg
  - caca\_attributes, [47](#)
- caca\_attr\_to\_argb64
  - caca\_attributes, [48](#)
- caca\_attr\_to\_rgb12\_bg
  - caca\_attributes, [48](#)
- caca\_attr\_to\_rgb12\_fg
  - caca\_attributes, [48](#)
- caca\_attributes
  - caca\_attr\_to\_ansi, [46](#)
  - caca\_attr\_to\_ansi\_bg, [47](#)
  - caca\_attr\_to\_ansi\_fg, [47](#)
  - caca\_attr\_to\_argb64, [48](#)
  - caca\_attr\_to\_rgb12\_bg, [48](#)
  - caca\_attr\_to\_rgb12\_fg, [48](#)
  - caca\_get\_attr, [43](#)
  - caca\_put\_attr, [45](#)
  - caca\_set\_attr, [43](#)
  - caca\_set\_color\_ansi, [45](#)
  - caca\_set\_color\_argb, [46](#)
  - caca\_toggle\_attr, [44](#)
  - caca\_unset\_attr, [44](#)
- caca\_blit
  - caca\_canvas, [33](#)
- caca\_canvas
  - caca\_blit, [33](#)
  - caca\_clear\_canvas, [32](#)
  - caca\_get\_canvas\_handle\_x, [33](#)
  - caca\_get\_canvas\_handle\_y, [33](#)
  - caca\_get\_char, [30](#)
  - caca\_gotoxy, [29](#)
  - CACA\_MAGIC\_FULLWIDTH, [28](#)
  - caca\_printf, [31](#)
  - caca\_put\_char, [29](#)
  - caca\_put\_str, [31](#)
  - caca\_set\_canvas\_boundaries, [34](#)
  - caca\_set\_canvas\_handle, [32](#)



- caca\_vprintf, 31
- caca\_where, 29
- caca\_wherey, 29
- caca\_canvas\_t
  - caca.h, 117
- caca\_charset
  - caca\_cp437\_to\_utf32, 51
  - caca\_utf32\_is\_fullwidth, 51
  - caca\_utf32\_to\_ascii, 51
  - caca\_utf32\_to\_cp437, 50
  - caca\_utf32\_to\_utf8, 50
  - caca\_utf8\_to\_utf32, 50
- caca\_clear\_canvas
  - caca\_canvas, 32
- caca\_clear\_dirty\_rect\_list
  - caca\_dirty, 37
- caca\_color
  - caca\_attr, 21
- CACA\_CONIO\_COLORS
  - caca.h, 119
- CACA\_CONIO\_CURSOR
  - caca.h, 120
- CACA\_CONIO\_MODE
  - caca.h, 120
- caca\_conio\_text\_info, 98
  - attribute, 99
  - currmode, 99
  - curx, 100
  - cury, 100
  - normattr, 99
  - screenheight, 100
  - screenwidth, 100
  - winbottom, 99
  - winleft, 99
  - winright, 99
  - wintop, 99
- caca\_cp437\_to\_utf32
  - caca\_charset, 51
- caca\_create\_canvas
  - libcaca, 23
- caca\_create\_display
  - caca\_display, 85
- caca\_create\_display\_with\_driver
  - caca\_display, 86
- caca\_create\_dither
  - caca\_dither, 64
- caca\_create\_frame
  - caca\_frame, 61
- caca\_dirty
  - caca\_add\_dirty\_rect, 36
  - caca\_clear\_dirty\_rect\_list, 37
  - caca\_disable\_dirty\_rect, 35
  - caca\_enable\_dirty\_rect, 35
  - caca\_get\_dirty\_rect, 36
  - caca\_get\_dirty\_rect\_count, 36
  - caca\_remove\_dirty\_rect, 37
- caca\_disable\_dirty\_rect
  - caca\_dirty, 35
- caca\_display
  - caca\_create\_display, 85
  - caca\_create\_display\_with\_driver, 86
  - caca\_free\_display, 87
  - caca\_get\_canvas, 87
  - caca\_get\_display\_driver, 87
  - caca\_get\_display\_driver\_list, 86
  - caca\_get\_display\_height, 89
  - caca\_get\_display\_time, 89
  - caca\_get\_display\_width, 89
  - caca\_refresh\_display, 88
  - caca\_set\_cursor, 90
  - caca\_set\_display\_driver, 87
  - caca\_set\_display\_time, 88
  - caca\_set\_display\_title, 89
  - caca\_set\_mouse, 90
- caca\_display\_t
  - caca.h, 117
- caca\_dither
  - caca\_create\_dither, 64
  - caca\_dither\_bitmap, 71
  - caca\_free\_dither, 72
  - caca\_get\_dither\_algorithm, 71
  - caca\_get\_dither\_algorithm\_list, 71
  - caca\_get\_dither\_antialias, 67
  - caca\_get\_dither\_antialias\_list, 67
  - caca\_get\_dither\_brightness, 65
  - caca\_get\_dither\_charset, 70
  - caca\_get\_dither\_charset\_list, 69
  - caca\_get\_dither\_color, 69
  - caca\_get\_dither\_color\_list, 68
  - caca\_get\_dither\_contrast, 66
  - caca\_get\_dither\_gamma, 66
  - caca\_set\_dither\_algorithm, 70
  - caca\_set\_dither\_antialias, 67
  - caca\_set\_dither\_brightness, 65
  - caca\_set\_dither\_charset, 69
  - caca\_set\_dither\_color, 68
  - caca\_set\_dither\_contrast, 66
  - caca\_set\_dither\_gamma, 65
  - caca\_set\_dither\_palette, 64
- caca\_dither\_bitmap
  - caca\_dither, 71
- caca\_dither\_t
  - caca.h, 117
- caca\_draw\_box
  - caca\_primitives, 56
- caca\_draw\_circle
  - caca\_primitives, 54
- caca\_draw\_cp437\_box

- caca\_primitives, 57
- caca\_draw\_ellipse
  - caca\_primitives, 55
- caca\_draw\_line
  - caca\_primitives, 53
- caca\_draw\_polyline
  - caca\_primitives, 53
- caca\_draw\_thin\_box
  - caca\_primitives, 56
- caca\_draw\_thin\_ellipse
  - caca\_primitives, 55
- caca\_draw\_thin\_line
  - caca\_primitives, 54
- caca\_draw\_thin\_polyline
  - caca\_primitives, 54
- caca\_draw\_thin\_triangle
  - caca\_primitives, 58
- caca\_draw\_triangle
  - caca\_primitives, 57
- caca\_enable\_dirty\_rect
  - caca\_dirty, 35
- caca\_event, 100
  - caca\_get\_event, 92
  - caca\_get\_event\_key\_ch, 93
  - caca\_get\_event\_key\_utf32, 94
  - caca\_get\_event\_key\_utf8, 94
  - caca\_get\_event\_mouse\_button, 94
  - caca\_get\_event\_mouse\_x, 95
  - caca\_get\_event\_mouse\_y, 95
  - caca\_get\_event\_resize\_height, 96
  - caca\_get\_event\_resize\_width, 95
  - caca\_get\_event\_type, 93
  - caca\_get\_mouse\_x, 92
  - caca\_get\_mouse\_y, 92
  - data, 101
  - type, 101
- caca\_event\_t
  - caca.h, 117
- caca\_event\_type
  - caca.h, 118
- caca\_export\_area\_to\_memory
  - caca\_importexport, 83
- caca\_export\_canvas\_to\_memory
  - caca\_importexport, 82
- caca\_file
  - caca\_file\_close, 77
  - caca\_file\_eof, 78
  - caca\_file\_gets, 78
  - caca\_file\_open, 76
  - caca\_file\_read, 77
  - caca\_file\_tell, 77
  - caca\_file\_write, 78
- caca\_file\_close
  - caca\_file, 77
- caca\_file\_eof
  - caca\_file, 78
- caca\_file\_gets
  - caca\_file, 78
- caca\_file\_open
  - caca\_file, 76
- caca\_file\_read
  - caca\_file, 77
- caca\_file\_t
  - caca.h, 117
- caca\_file\_tell
  - caca\_file, 77
- caca\_file\_write
  - caca\_file, 78
- caca\_fill\_box
  - caca\_primitives, 57
- caca\_fill\_ellipse
  - caca\_primitives, 55
- caca\_fill\_triangle
  - caca\_primitives, 58
- caca\_fill\_triangle\_textured
  - caca\_primitives, 59
- caca\_flip
  - caca\_transform, 39
- caca\_flop
  - caca\_transform, 39
- caca\_font
  - caca\_free\_font, 75
  - caca\_get\_font\_blocks, 74
  - caca\_get\_font\_height, 74
  - caca\_get\_font\_list, 73
  - caca\_get\_font\_width, 73
  - caca\_load\_font, 73
  - caca\_render\_canvas, 74
- caca\_font\_t
  - caca.h, 117
- caca\_frame
  - caca\_create\_frame, 61
  - caca\_free\_frame, 62
  - caca\_get\_frame\_count, 60
  - caca\_get\_frame\_name, 61
  - caca\_set\_frame, 60
  - caca\_set\_frame\_name, 61
- caca\_free\_canvas
  - libcaca, 26
- caca\_free\_display
  - caca\_display, 87
- caca\_free\_dither
  - caca\_dither, 72
- caca\_free\_font
  - caca\_font, 75
- caca\_free\_frame
  - caca\_frame, 62
- caca\_get\_attr

- caca\_attributes, [43](#)
- caca\_get\_canvas
  - caca\_display, [87](#)
- caca\_get\_canvas\_attrs
  - libcaca, [26](#)
- caca\_get\_canvas\_chars
  - libcaca, [26](#)
- caca\_get\_canvas\_handle\_x
  - caca\_canvas, [33](#)
- caca\_get\_canvas\_handle\_y
  - caca\_canvas, [33](#)
- caca\_get\_canvas\_height
  - libcaca, [25](#)
- caca\_get\_canvas\_width
  - libcaca, [25](#)
- caca\_get\_char
  - caca\_canvas, [30](#)
- caca\_get\_dirty\_rect
  - caca\_dirty, [36](#)
- caca\_get\_dirty\_rect\_count
  - caca\_dirty, [36](#)
- caca\_get\_display\_driver
  - caca\_display, [87](#)
- caca\_get\_display\_driver\_list
  - caca\_display, [86](#)
- caca\_get\_display\_height
  - caca\_display, [89](#)
- caca\_get\_display\_time
  - caca\_display, [89](#)
- caca\_get\_display\_width
  - caca\_display, [89](#)
- caca\_get\_dither\_algorithm
  - caca\_dither, [71](#)
- caca\_get\_dither\_algorithm\_list
  - caca\_dither, [71](#)
- caca\_get\_dither\_antialias
  - caca\_dither, [67](#)
- caca\_get\_dither\_antialias\_list
  - caca\_dither, [67](#)
- caca\_get\_dither\_brightness
  - caca\_dither, [65](#)
- caca\_get\_dither\_charset
  - caca\_dither, [70](#)
- caca\_get\_dither\_charset\_list
  - caca\_dither, [69](#)
- caca\_get\_dither\_color
  - caca\_dither, [69](#)
- caca\_get\_dither\_color\_list
  - caca\_dither, [68](#)
- caca\_get\_dither\_contrast
  - caca\_dither, [66](#)
- caca\_get\_dither\_gamma
  - caca\_dither, [66](#)
- caca\_get\_event
  - caca\_event, [92](#)
- caca\_get\_event\_key\_ch
  - caca\_event, [93](#)
- caca\_get\_event\_key\_utf32
  - caca\_event, [94](#)
- caca\_get\_event\_key\_utf8
  - caca\_event, [94](#)
- caca\_get\_event\_mouse\_button
  - caca\_event, [94](#)
- caca\_get\_event\_mouse\_x
  - caca\_event, [95](#)
- caca\_get\_event\_mouse\_y
  - caca\_event, [95](#)
- caca\_get\_event\_resize\_height
  - caca\_event, [96](#)
- caca\_get\_event\_resize\_width
  - caca\_event, [95](#)
- caca\_get\_event\_type
  - caca\_event, [93](#)
- caca\_get\_export\_list
  - caca\_importexport, [84](#)
- caca\_get\_font\_blocks
  - caca\_font, [74](#)
- caca\_get\_font\_height
  - caca\_font, [74](#)
- caca\_get\_font\_list
  - caca\_font, [73](#)
- caca\_get\_font\_width
  - caca\_font, [73](#)
- caca\_get\_frame\_count
  - caca\_frame, [60](#)
- caca\_get\_frame\_name
  - caca\_frame, [61](#)
- caca\_get\_import\_list
  - caca\_importexport, [82](#)
- caca\_get\_mouse\_x
  - caca\_event, [92](#)
- caca\_get\_mouse\_y
  - caca\_event, [92](#)
- caca\_get\_version
  - libcaca, [27](#)
- caca\_gotoxy
  - caca\_canvas, [29](#)
- caca\_import\_area\_from\_file
  - caca\_importexport, [82](#)
- caca\_import\_area\_from\_memory
  - caca\_importexport, [81](#)
- caca\_import\_canvas\_from\_file
  - caca\_importexport, [80](#)
- caca\_import\_canvas\_from\_memory
  - caca\_importexport, [80](#)
- caca\_importexport
  - caca\_export\_area\_to\_memory, [83](#)
  - caca\_export\_canvas\_to\_memory, [82](#)

- caca\_get\_export\_list, 84
- caca\_get\_import\_list, 82
- caca\_import\_area\_from\_file, 82
- caca\_import\_area\_from\_memory, 81
- caca\_import\_canvas\_from\_file, 80
- caca\_import\_canvas\_from\_memory, 80
- caca\_invert
  - caca\_transform, 39
- caca\_key
  - caca.h, 118
- caca\_load\_font
  - caca\_font, 73
- CACA\_MAGIC\_FULLWIDTH
  - caca\_canvas, 28
- caca\_manage\_canvas
  - libcaca, 23
- caca\_primitives
  - caca\_draw\_box, 56
  - caca\_draw\_circle, 54
  - caca\_draw\_cp437\_box, 57
  - caca\_draw\_ellipse, 55
  - caca\_draw\_line, 53
  - caca\_draw\_polyline, 53
  - caca\_draw\_thin\_box, 56
  - caca\_draw\_thin\_ellipse, 55
  - caca\_draw\_thin\_line, 54
  - caca\_draw\_thin\_polyline, 54
  - caca\_draw\_thin\_triangle, 58
  - caca\_draw\_triangle, 57
  - caca\_fill\_box, 57
  - caca\_fill\_ellipse, 55
  - caca\_fill\_triangle, 58
  - caca\_fill\_triangle\_textured, 59
- caca\_printf
  - caca\_canvas, 31
- caca\_put\_attr
  - caca\_attributes, 45
- caca\_put\_char
  - caca\_canvas, 29
- caca\_put\_str
  - caca\_canvas, 31
- caca\_rand
  - libcaca, 27
- caca\_refresh\_display
  - caca\_display, 88
- caca\_remove\_dirty\_rect
  - caca\_dirty, 37
- caca\_render\_canvas
  - caca\_font, 74
- caca\_rotate\_180
  - caca\_transform, 39
- caca\_rotate\_left
  - caca\_transform, 40
- caca\_rotate\_right
  - caca\_transform, 40
- caca\_set\_attr
  - caca\_attributes, 43
- caca\_set\_canvas\_boundaries
  - caca\_canvas, 34
- caca\_set\_canvas\_handle
  - caca\_canvas, 32
- caca\_set\_canvas\_size
  - libcaca, 24
- caca\_set\_color\_ansi
  - caca\_attributes, 45
- caca\_set\_color\_argb
  - caca\_attributes, 46
- caca\_set\_cursor
  - caca\_display, 90
- caca\_set\_display\_driver
  - caca\_display, 87
- caca\_set\_display\_time
  - caca\_display, 88
- caca\_set\_display\_title
  - caca\_display, 89
- caca\_set\_dither\_algorithm
  - caca\_dither, 70
- caca\_set\_dither\_antialias
  - caca\_dither, 67
- caca\_set\_dither\_brightness
  - caca\_dither, 65
- caca\_set\_dither\_charset
  - caca\_dither, 69
- caca\_set\_dither\_color
  - caca\_dither, 68
- caca\_set\_dither\_contrast
  - caca\_dither, 66
- caca\_set\_dither\_gamma
  - caca\_dither, 65
- caca\_set\_dither\_palette
  - caca\_dither, 64
- caca\_set\_frame
  - caca\_frame, 60
- caca\_set\_frame\_name
  - caca\_frame, 61
- caca\_set\_mouse
  - caca\_display, 90
- caca\_stretch\_left
  - caca\_transform, 41
- caca\_stretch\_right
  - caca\_transform, 41
- caca\_style
  - caca\_attr, 22
- caca\_toggle\_attr
  - caca\_attributes, 44
- caca\_transform
  - caca\_flip, 39
  - caca\_flop, 39

- caca\_invert, [39](#)
  - caca\_rotate\_180, [39](#)
  - caca\_rotate\_left, [40](#)
  - caca\_rotate\_right, [40](#)
  - caca\_stretch\_left, [41](#)
  - caca\_stretch\_right, [41](#)
- caca\_unmanage\_canvas
  - libcaca, [24](#)
- caca\_unset\_attr
  - caca\_attributes, [44](#)
- caca\_utf32\_is\_fullwidth
  - caca\_charset, [51](#)
- caca\_utf32\_to\_ascii
  - caca\_charset, [51](#)
- caca\_utf32\_to\_cp437
  - caca\_charset, [50](#)
- caca\_utf32\_to\_utf8
  - caca\_charset, [50](#)
- caca\_utf8\_to\_utf32
  - caca\_charset, [50](#)
- caca\_vprintf
  - caca\_canvas, [31](#)
- caca\_wherex
  - caca\_canvas, [29](#)
- caca\_wherey
  - caca\_canvas, [29](#)
- currmode
  - caca\_conio\_text\_info, [99](#)
- curx
  - caca\_conio\_text\_info, [100](#)
- cury
  - caca\_conio\_text\_info, [100](#)
- data
  - caca\_event, [101](#)
- libcaca
  - caca\_create\_canvas, [23](#)
  - caca\_free\_canvas, [26](#)
  - caca\_get\_canvas\_attrs, [26](#)
  - caca\_get\_canvas\_chars, [26](#)
  - caca\_get\_canvas\_height, [25](#)
  - caca\_get\_canvas\_width, [25](#)
  - caca\_get\_version, [27](#)
  - caca\_manage\_canvas, [23](#)
  - caca\_rand, [27](#)
  - caca\_set\_canvas\_size, [24](#)
  - caca\_unmanage\_canvas, [24](#)
- libcaca attribute conversions, [42](#)
- libcaca attribute definitions, [20](#)
- libcaca basic functions, [22](#)
- libcaca bitmap dithering, [62](#)
- libcaca canvas drawing, [27](#)
- libcaca canvas frame handling, [59](#)
- libcaca canvas transformation, [38](#)
- libcaca character set conversions, [49](#)
- libcaca dirty rectangle manipulation, [34](#)
- libcaca display functions, [84](#)
- libcaca DOS conio.h compatibility layer, [96](#)
- libcaca event handling, [91](#)
- libcaca FIGfont handling, [75](#)
- libcaca file IO, [76](#)
- libcaca font handling, [72](#)
- libcaca importers/exporters from/to various, [79](#)
- libcaca primitives drawing, [52](#)
- normattr
  - caca\_conio\_text\_info, [99](#)
- screenheight
  - caca\_conio\_text\_info, [100](#)
- screenwidth
  - caca\_conio\_text\_info, [100](#)
- type
  - caca\_event, [101](#)
- winbottom
  - caca\_conio\_text\_info, [99](#)
- winleft
  - caca\_conio\_text\_info, [99](#)
- winright
  - caca\_conio\_text\_info, [99](#)
- wintop
  - caca\_conio\_text\_info, [99](#)