Guile-SDL

SDL for Guile
Version 0.5.2

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1 Introduction

The (sdl *) modules are an interface to the SDL (Simple Direct Media Layer) library. The goal is to provide both a clean and direct interface to the lowest level SDL, while extending with higher level concepts where useful, such as default arguments and functional-style application of graphics routines. Several SDL add-on libraries have been wrapped and included with Guile-SDL, including SDL_image (for loading multiple image formats), SDL_ttf (for rendering true type fonts), SDL_mixer (for playing/mixing different audio formats), and SDL_rotozoom (for rotating and scaling images). In addition, some low-level 2D graphics primitives have been provided.

1.1 Quick Start

To whet your appetite, and hopefully get you excited about the ease and flexibility of programming with Guile-SDL, we begin with a simple example. The following program is a simple image browser. You can cycle through images by using space, n or right to go forward, backspace, p or left to go backwards, and escape or q to quit.

```
;; load the SDL module and some useful srfi's
(use-modules ((sdl sdl) #:prefix SDL:)
             (srfi srfi-1)
             (srfi srfi-2))

;; initialize the video subsystem
(SDL:init 'video)

;; directory to search for images in
(define image-dir "/usr/share/pixmaps/")

;; utility to test if a path is a directory
(define (file? f)
  (let* ((stats (stat f))
         (type (stat:type stats)))
    (eq? type 'regular)))

;; build a ring of image file names
(define image-ring
  (let ((dir (opendir image-dir)))
    (letrec ((D (lambda (ls)
                  (let ((file (readdir dir)))
                    (if (eof-object? file)
                        (begin (closedir dir) ls)
                        (D (cons (string-append image-dir file)
                                 ls)))))))
      (apply circular-list (reverse (filter file? (D '()))))))

;; functions to cycle through the ring
(define (next-image)
  (let ((next (car image-ring)))
    (set! image-ring (cdr image-ring))
    next))

(define (prev-image)
```

```
  (let ((orig image-ring))
    (while (not (eq? (cddr image-ring) orig))
      (set! image-ring (cdr image-ring)))
    (let ((image (car image-ring)))
      (set! image-ring (cdr image-ring))
      image)))

;; display an image given a filename
(define (show file)
  (and-let* ((image (SDL:load-image file)))
    (SDL:set-video-mode (SDL:surface:w image) (SDL:surface:h image) 24)
    (SDL:blit-surface image)
    (SDL:flip)))

;; show the first image
(show (next-image))

;; event handler
(let handle ((e (SDL:make-event)))
  (if (SDL:wait-event e)
    (case (SDL:event:type e)
      ((key-down)
       (case (SDL:event:key:keysym:sym e)
         ((left backspace)
          (show (prev-image)))
         ((right space)
          (show (next-image)))
         ((escape q)
          (SDL:quit)
          (quit))))))
  (handle e))
```

1.2 Naming Conventions

The most important thing to learning a wrapped library for a programming language, assuming you know the language and the library, is to know the naming conventions. Then you can begin programming without having to look up the exact function reference (available in the rest of this document).

1.2.1 Renaming C Functions

As with standard guile naming conventions, all names are converted to lower-case, and underscores are replaced with hyphens. Functions that modify one or more arguments have an exclamation point (`!`) appended, and functions which ask a question and return a boolean value have a question mark (`?`) appended.

1.2.2 Enums and Constants

SDL enumerated types and constants are passed and returned as symbols, thus enforcing their `"constant"` nature and for ease of use in `case` statements. Flags, such as the SDL initialization flags and video surface flags, are treated as lists of symbols, each constant in the flag group that you would `or` together in C code becoming a symbol in the list.

Some of these symbols retain their exact C names, while others are adapted to better fit Scheme (mostly by removing the 'SDL_' prefix, changing underscores to hyphens, downcasing, and inserting a hyphen between "words").

A particular set of enums is called an *enumstash*. Likewise *flagstash* for flags.

You can use `kotk` to examine the enums and flags encapsulated by these respectively typed objects. You can also use integers where enums/flags are expected, and can convert between the symbol and numeric value with `enum->number`, `number->enum`, `flags->number` and `number->flags`.

The conversion procs all take *stash* as the first argument, a symbol that identifies the particular set of enums/flags. For backward compatibility, *stash* may also be such an object, but this support **will be removed** after 2013-12-31, when those objects are to be fully internalized.

`kotk` [*name*] [Procedure]

Return the contents of stash *name* (a symbol), as an alist with symbolic keys, integer values. If *name* is omitted, the keys are the names of the all the enum- and flagstashes, and the values have the form:

```
(N TYPE)
```

where *n* is the count of symbols in that stash, and *type* is a symbol: `enums` or `flags`.

`enum->number` *stash symbol* [Procedure]

Return the number in *stash* associated with *symbol*.

`number->enum` *stash number* [Procedure]

Return the symbol associated with *number*, or `#f` if it does not belong to *stash*.

`flags->number` *stash flags* [Procedure]

Use *stash* to convert *flags* to a number. *flags* is a list of symbols; or `#f`, which is taken as the empty list; or `#t`, which is taken as the list of all possible symbols in *stash*.

`number->flags` *stash number* [Procedure]

Use *stash* to convert *number* to a list of symbols. If the flags in *stash* are not sufficient to decode *number*, the first element of the list is the numeric remainder.

Conversion from symbols to numbers (including `enum->number` and `flags->number`) throws an error with key `non-member-symbol` if the specified symbol is not a member of the respective enumstash or flagstash.

1.2.3 Create and Make

The standard SDL prefix for creating a new instance of a type is `create`. The standard Guile prefix is `make`. Wherever an SDL function uses the `create` prefix we will keep it. Object creation functions unique to Guile, such as `make-rect`, will use `make` as a prefix. In addition, we will sometimes introduce higher-level creation functions, such as `make-surface`, which is a wrapper to `create-rgb-surface` which provides useful default values from the current screen information.

1.3 Uniform Vectors

Some procedures take one or more *uniform vector* arguments, as specified in SRFI 4 (see Chapter 3 [Video], page 6, see Chapter 10 [SDL_gfx], page 27). The specific type of vector is one of `u8`, `u16`, `s16`, where `u` or `s` stands for "unsigned" or "signed", respectively, and the rest the number of bits.

1.4 Limitations

There are some known problems with Guile-SDL modules. This section attempts to make them well-known, if not well-liked...

- API in flux

  Since Guile-SDL is in alpha stage, its interfaces are not stable. Specifically, module names, the contents of modules, procedure names, procedure behavior: all these can change at any time up until the 1.0 release. C'est la vie.

- no logo

  How can any self-respecting package of bindings for libsdl not have a flashy, animated logo? Bonus points for suitable accompanying sound blurb.

- threading picture unclear

  Where do threads fit in if at all? Why doesn't the Guile-SDL maintainer learn all about threads, fix guile-1.4.x to support that and then arrange for Guile-SDL to DTRT? Questions questions...

- [your gripes here]

2 General SDL

`init` *sel* [Procedure]
Initialize SDL and the subsystems/configuration represented by *sel* (see [init flags], page 41).

`init-subsystem` *sel* [Procedure]
Initialize the SDL subsystems represented by *sel*. *sel* is a list of flags (symbols) from the same set useful for `init`.

`quit` [Procedure]
Shut down all SDL subsystems. Return `#t`.

`quit-subsystem` *sel* [Procedure]
Shut down the SDL subsystems represented by *sel*. *sel* is a list of flags (symbols) from the same set useful for `init`. Return `#t`.

`was-init` *sel* [Procedure]
Check if the SDL subsystems represented by *sel* have been initialized. *sel* is a list of flags (symbols) from the same set useful for `init`. Return a list likewise composed.

`get-ticks` [Procedure]
Return the number of milliseconds since the SDL library initialization.

`delay` *ms* [Procedure]
Wait *ms* milliseconds.

`get-error` [Procedure]
Return the current SDL error string.

3 Video

`create-cursor` *data mask w h x y* [Procedure]
Return a new cursor from *data* and *mask* (both u8 uniform vectors), sized *w* by *h* and with hot pixel located at *x*,*y*.

`create-yuv-overlay` *width height format* [*display*] [Procedure]
Create a new YUV overlay, sized *width* by *height* with overlay *format* (a symbol or an exact number). Optional arg *display* specifies a surface to use instead of creating a new one.

`get-video-surface` [Procedure]
Return the current display surface.

`video-cmf` [Procedure]
Return information about the video hardware as three values: `capabilities` (list of symbols), `memory` (integer), and `format` (pixel format object). The `capabilities` are:

```
hw-available
wm-available
blit-hw   blit-hw-CC   blit-hw-A
blit-sw   blit-sw-CC   blit-sw-A
blit-fill
```

`video-driver-name` [Procedure]
Return the name of the video driver.

`list-modes` [*format* [*flags*]] [Procedure]
Return a list of available screen dimensions for pixel *format* and *flags* (see [video flags], page 43). Format defaults to that for the current screen. Flags default to none. Return `#f` if no modes are available, `#t` if all are available.

`video-mode-ok` *width height bpp* [*flags*] [Procedure]
Check to see if a particular video mode is supported. Args are *width*, *height*, *bpp* (numbers), and *flags* (see [video flags], page 43). Return `#f` if the mode is not supported, or a number indicating the bits-per-pixel of the closest available mode supporting *width* and *height*.

`set-video-mode` *width height bpp* [*flags*] [Procedure]
Set the SDL video mode with *width*, *height* and bits-per-pixel *bpp*. Optional arg *flags* (see [video flags], page 43) is supported. Return a new surface.

3.1 Rectangles

`rect?` *obj* [Procedure]
Return `#t` iff *obj* is an SDL-rectangle object.

`make-rect` *x y width height* [Procedure]
Return a rectangle object with location *x*,*y* and dimensions *width* by *height*.

`rect:x` *rect* [Procedure]
Get `x` from *rect*.

`rect:y` *rect* [Procedure]
Get `y` from *rect*.

`rect:w` *rect* [Procedure]
Get `w` from *rect*.

`rect:h` *rect* [Procedure]
Get `h` from *rect*.

`rect:set-x!` *rect value* [Procedure]
Set `x` in *rect* to *value*.

`rect:set-y!` *rect value* [Procedure]
Set `y` in *rect* to *value*.

`rect:set-w!` *rect value* [Procedure]
Set `w` in *rect* to *value*.

`rect:set-h!` *rect value* [Procedure]
Set `h` in *rect* to *value*.

`update-rect` *surface x* [*y* [*w* [*h*]]] [Procedure]
Update *surface* within a specified rectangle. The second arg can either be an SDL-Rect object, or the second through fifth args are numbers specifying the x, y, width and height of a rectangular area.

`update-rects` *surface ls* [Procedure]
On *surface*, update the rectangles in *ls*, a list of rectangles.

`flip` [*surface*] [Procedure]
Swap double buffers of the default surface, or of *surface* if specified.

3.2 Colors

`color?` *obj* [Procedure]
Return `#t` iff *obj* is an SDL-Color object.

`make-color` *r g b* [Procedure]
Return a color object with *r*, *g*, and *b* components.

`color:r` *color* [Procedure]
Get `r` from *color*.

`color:g` *color* [Procedure]
Get `g` from *color*.

`color:b` *color* [Procedure]
Get `b` from *color*.

`color:set-r!` *color value* [Procedure]
Set `r` in *color* to *value*.

`color:set-g!` *color value* [Procedure]
Set `g` in *color* to *value*.

`color:set-b!` *color value* [Procedure]
Set `b` in *color* to *value*.

`set-colors!` *surface colors* [*start*] [Procedure]
Set a portion of the colormap for the 8-bit *surface* using *colors*, a vector of SDL-Colors. Optional arg *start* (an integer in the range [0,255]) specifies the portion to be modified. It defaults to 0.

`set-palette` *surface flags colors* [*start*] [Procedure]
Set the palette of an 8-bit *surface* using *flags* (see [palette flags], page 43) and *colors*, a vector of SDL-Colors. Optional arg *start* (an integer in the range [0,255]) specifies the portion to be modified. It defaults to 0.

`set-gamma` *redgamma greengamma bluegamma* [Procedure]
Set the color gamma function for the display using real numbers *redgamma*, *greengamma* and *bluegamma*.

`get-gamma-ramp` [Procedure]
Return the gamma translation lookup tables currently used by the display as a list of three tables, for red, green and blue. Each table is a u16 uniform vector of length 256. Return `#f` if unsuccessful.

`set-gamma-ramp` *r g b* [Procedure]
Set the gamma translation lookup tables currently used by the display to tables *r*, *g* and *b*, each a u16 uniform vector of length 256, or `#f`, in which case that particular component is unchanged. Return `#t` if successful.

`map-rgb` *format r* [*g* [*b*]] [Procedure]
Map a RGB color value to the pixel *format*. The second arg can be an SDL-Color, otherwise the second through fourth args are red, green and blue values (numbers). Return the mapped components as an unsigned integer.

`map-rgba` *format r g* [*b* [a]] [Procedure]
Map a RGB color value to the pixel *format*. If the second arg is an SDL-Color, the third is an alpha value (number). Otherwise, the second through fifth args are red, green, blue and alpha values (numbers). Return the mapped components as an unsigned integer.

`pixel-rgb` *pixel format* [Procedure]
Return RGB info from *pixel* in the specified pixel *format* as three values: `r`, `g` and `b` (all integers).

`pixel-rgba` *pixel format* [Procedure]
Return RGBA info from *pixel* in the specified pixel *format* as four values: `r`, `g`, `b` and `a` (all integers).

`fill-rect` *surface rect color* [Procedure]
Fill *surface rect* with *color* (a number). If *rect* is `#f`, fill the entire surface. Return `#t` if successful.

`display-format` *surface* [Procedure]
Return a new surface made by converting *surface* to the display format. Return `#f` if not successful.

`display-format-alpha` *surface* [Procedure]
Return a new surface made by converting *surface* to the display format, with an alpha channel. Return `#f` if not successful.

`warp-mouse` *x y* [Procedure]
Set the position of the mouse cursor to *x*,*y*.

`set-cursor` *cursor* [Procedure]
Set the current mouse cursor to *cursor*.

`get-cursor` [Procedure]
Get the current mouse cursor.

`show-cursor` [*setting*] [Procedure]
Return the current visibility of the pointer (aka "mouse cursor") as a boolean. If arg *setting* (a boolean) is specified, set the visibility to *setting* (the returned visibility corresponds to that before the call, regardless).

`gl-get-attribute` *attribute* [Procedure]
Return the value of a special SDL/OpenGL *attribute*.

`gl-set-attribute` *attribute value* [Procedure]
Set the special SDL/OpenGL *attribute* to *value*. Both args are numbers.

`gl-swap-buffers` [Procedure]
Swap OpenGL framebuffers/Update Display.

`lock-yuv-overlay` *overlay* [Procedure]
Lock the given YUV *overlay*. Return `#f` if successful.

`unlock-yuv-overlay` *overlay* [Procedure]
Unlock the previously locked YUV *overlay*.

`display-yuv-overlay` *overlay dstrect* [Procedure]
Blit the YUV *overlay* to the display *dstrect* over which it was created. Return `#t` if successful.

3.3 Windowing System Interaction

`get-wm-info` [Procedure]
Return information on the window manager, as a list of the form: (VERSION SUBSYSTEM DISPLAY WINDOW FSWINDOW WMWINDOW). VERSION is a sub-list of form: (MAJOR MINOR PATCH), where element is an integer. SUBSYSTEM is either the symbol `x11`, or `#f`. DISPLAY is a pointer (machine address) of the X11 Display structure, converted to an integer. WINDOW, FSWINDOW and WMWINDOW are Window identifiers (also integers).

`set-caption` *title* [*icon*] [Procedure]
Set the title-bar and icon name of the display window to *title* and *icon* (both strings), respectively. If *icon* is not specified, use *title* by default.

`caption-ti` [Procedure]
Return display-window caption as two values: `title` and `icon` (both strings, or `#f` if not set).

`set-icon` *icon* [Procedure]
Set *icon* for the display window.

`iconify-window` [Procedure]
Iconify/Minimize the window. Return `#t` if successful.

`toggle-full-screen` [*surface*] [Procedure]
Toggle the default video surface between windowed and fullscreen mode, if supported. Optional arg *surface* specifies another surface to toggle. Return `#t` if successful.

`grab-input` [*mode*] [Procedure]
Grab mouse and keyboard input. Return new grab state. Optional arg *mode* (a symbol) specifies the kind of grab, one of `query` (the default), `off` or `on`.

`get-app-state` [Procedure]
Return the current state of the application, a list of symbols. The list may include: 'mouse-focus', 'inputfocus', 'active'.

3.4 Surface

`make-surface` *width height* [*flags*] [Procedure]
Return a new surface of dimensions *width* by *height*. Optional third arg *flags* (see [video flags], page 43) further specifies the surface. Color depth and masks are those for the current video surface.

`create-rgb-surface` *flags width height depth rmask gmask bmask amask* [Procedure]
Return an empty surface. The eight arguments, directly analagous to those for SDL_CreateRGBSurface, are: *flags* (list of symbols, see [video flags], page 43), *width*, *height*, *depth*, *rmask*, *gmask*, *bmask*, *amask* (all numbers).

`surface:w` *surface* [Procedure]
Get `w` from *surface*.

`surface:h` *surface* [Procedure]
Get `h` from *surface*.

`surface:depth` *surface* [Procedure]
Get `format->BitsPerPixel` from *surface*.

`surface:flags` *surface* [Procedure]
Return `flags` from *surface* as a (possibly empty) list of symbols.

`surface-get-format` *surface* [Procedure]
Return a new pixel format, the same used by *surface*.

`surface?` *obj* [Procedure]
Return true iff *obj* is a surface.

`lock-surface` *surface* [Procedure]
Lock *surface* for direct access. Return `#t` if successful.

`unlock-surface` *surface* [Procedure]
Unlock previously locked *surface*.

`load-bmp` *filename* [Procedure]
Load bitmap data from *filename*. Return a new surface if successful, otherwise `#f`.

`load-image` *filename* [Procedure]
Load image data from *filename*. Return a new surface if successful, otherwise `#f`.

`save-bmp` *surface filename* [Procedure]
Save *surface* to *filename* in Windows BMP format. Return `#t` if successful.

`surface-color-key!` *surface pixel* [*rle*] [Procedure]
Set the color key for *surface* to *pixel*. If *pixel* is `#f`, clear the current color key. Otherwise, it should be an integer of the appropriate depth for *surface* (e.g., in the range [0,65535] for 16 bpp). If color key processing is enabled, optional arg *rle* is a boolean that enables (true) or disables (false, the default) RLE acceleration. Return `#t` if successful.

`surface-alpha!` *surface alpha* [*rle*] [Procedure]
Set alpha blending for the entire *surface* to *alpha*. If *alpha* is `#f`, disable alpha blending. Otherwise it should be an integer in the range [0,255] or one of the symbols `transparent` or `opaque`. If alpha blending is enabled, optional arg *rle* is a boolean that enables (true) or disables (false, the default) RLE acceleration. Return `#t` if successful.

`set-clip-rect!` *surface* [*rect*] [Procedure]

Set *surface* clipping rectangle to the whole surface. Optional arg *rect*, if non-`#f`, specifies a particular rectangle instead of using the whole surface.

`get-clip-rect` *surface* [Procedure]

Return the clipping rectangle for *surface*.

`convert-surface` *surface format* [*flags*] [Procedure]

Convert *surface* to the same *format* as another surface. Optional third arg *flags* is a list of flags (see [video flags], page 43).

`blit-surface` *src* [*srcrect* [*dst* [*dstrect*]]] [Procedure]

Perform a fast blit from the *src* surface *srcrect* to the *dst* surface *dstrect*. *srcrect* defaults to x=0, y=0, *src* surface dimensions. If unspecified *dst* is taken as the default video surface. *dstrect* likewise defaults to x=0, y=0, *dst* surface dimensions.

3.5 Misc Surface Operations

`vertical-flip-surface` *surface* [Procedure]

Return a new surface created by flipping *surface* vertically.

`horizontal-flip-surface` *surface* [Procedure]

Return a new surface created by flipping *surface* horizontally.

`vh-flip-surface` *surface* [Procedure]

Return a new surface created by flipping *surface* both vertically and horizontally.

`surface-pixels` *surface* [*squash*] [Procedure]

Return pixel data of *surface* as a new uniform vector. The uvec has type `u8`, `u16` or `u32`, corresponding to the *surface* depth, with *height* x *width* elements. A 24bpp surface — *depth-in-bytes* of 3 — is expanded (per pixel) to `u32`, leaving the high nybble clear.

Optional arg *squash* non-`#f` means to return a u8vector regardless of *surface* depth, with *height* x *width* x *depth-in-bytes* elements.

4 Events

`make-event` [*type*] [Procedure]
Return a new SDL event. Optional arg *type* is a symbol (see [event-type enums], page 41). If omitted, the default is `SDL_NOEVENT`.

`event:type` *event* [Procedure]
Return the symbolic `type` from *event*.

`event:set-type!` *event value* [Procedure]
Set `type` in *event* to *value*, a symbol or integer.

4.1 Activity

The value for `event:active:gain` and `event:active:set-gain!` is a symbol, one of: `gained` or `lost`.

The value for `event:active:state` and `event:active:set-state!` is a (possibly empty) list of symbols from the same set used by `get-app-state`.

`event:active:gain` *event* [Procedure]
Return the symbolic `active.gain` from *event*.

`event:active:state` *event* [Procedure]
Return `active.state` from *event* as a (possibly empty) list of symbols.

`event:active:set-gain!` *event value* [Procedure]
Set `active.gain` in *event* to *value*, a symbol or integer.

`event:active:set-state!` *event value* [Procedure]
Set `active.state` in *event* to *value*, a (possibly empty) list of symbols.

4.2 Keys

The value for `event:key:state` and `event:key:set-state!` is a symbol, one of: `released` or `pressed`.

`event:key:keysym:sym` *event* [Procedure]
Return the symbolic `key.keysym.sym` from *event*.

`event:key:keysym:set-sym!` *event value* [Procedure]
Set `key.keysym.sym` in *event* to *value*, a symbol or integer.

`event:key:keysym:mod` *event* [Procedure]
Return `key.keysym.mod` from *event* as a (possibly empty) list of symbols.

`event:key:keysym:set-mod!` *event value* [Procedure]
Set `key.keysym.mod` in *event* to *value*, a (possibly empty) list of symbols.

`event:key:state` *event* [Procedure]
Return the symbolic `key.state` from *event*.

`event:key:keysym:scancode` *event* [Procedure]
Get `key.keysym.scancode` from *event*.

`event:key:keysym:unicode` *event* [Procedure]
Get `key.keysym.unicode` from *event*.

`event:key:set-state!` *event value* [Procedure]
Set `key.state` in *event* to *value*, a symbol or integer.

`event:key:keysym:set-scancode!` *event value* [Procedure]
Set `key.keysym.scancode` in *event* to *value*.

`event:key:keysym:set-unicode!` *event value* [Procedure]
Set `key.keysym.unicode` in *event* to *value*.

4.3 Motions

`event:motion:state` *event* [Procedure]
Return `motion.state` from *event* as a (possibly empty) list of symbols.

`event:motion:x` *event* [Procedure]
Get `motion.x` from *event*.

`event:motion:y` *event* [Procedure]
Get `motion.y` from *event*.

`event:motion:xrel` *event* [Procedure]
Get `motion.xrel` from *event*.

`event:motion:yrel` *event* [Procedure]
Get `motion.yrel` from *event*.

`event:motion:set-state!` *event value* [Procedure]
Set `motion.state` in *event* to *value*, a (possibly empty) list of symbols.

`event:motion:set-x!` *event value* [Procedure]
Set `motion.x` in *event* to *value*.

`event:motion:set-y!` *event value* [Procedure]
Set `motion.y` in *event* to *value*.

`event:motion:set-xrel!` *event value* [Procedure]
Set `motion.xrel` in *event* to *value*.

`event:motion:set-yrel!` *event value* [Procedure]
Set `motion.yrel` in *event* to *value*.

4.4 Buttons

The value for `event:button:button` and `event:button:set-button!` is a (possibly empty) list of symbols from the set:

```
left middle right
wheel-up wheel-down
x1 x2
```

The value for `event:button:state` and `event:button:set-state!` is a symbol, one of: `released` or `pressed`.

`event:button:button` *event* [Procedure]
Return the symbolic `button.button` from *event*.

`event:button:state` *event* [Procedure]
Return the symbolic `button.state` from *event*.

`event:button:x` *event* [Procedure]
Get `button.x` from *event*.

`event:button:y` *event* [Procedure]
Get `button.y` from *event*.

`event:button:set-button!` *event value* [Procedure]
Set `button.button` in *event* to *value*, a symbol or integer.

`event:button:set-state!` *event value* [Procedure]
Set `button.state` in *event* to *value*, a symbol or integer.

`event:button:set-x!` *event value* [Procedure]
Set `button.x` in *event* to *value*.

`event:button:set-y!` *event value* [Procedure]
Set `button.y` in *event* to *value*.

4.5 Joysticks

The value for `event:jbutton:state` and `event:jbutton:set-state!` is a symbol, one of: `released` or `pressed`.

The value for `event:jhat:value` and `event:jhat:set-value!` is a list of or more symbols from the set:

```
centered
up    down
left  right
```

Specifying the empty list for `event:jhat:set-value!` is effectively the same as specifying `centered`.

`event:jaxis:which` *event* [Procedure]
Get `jaxis.which` from *event*.

`event:jaxis:axis` *event* [Procedure]
Get `jaxis.axis` from *event*.

`event:jaxis:value` *event* [Procedure]
Get `jaxis.value` from *event*.

`event:jaxis:set-which!` *event value* [Procedure]
Set `jaxis.which` in *event* to *value*.

`event:jaxis:set-axis!` *event value* [Procedure]
Set `jaxis.axis` in *event* to *value*.

`event:jaxis:set-value!` *event value* [Procedure]
Set `jaxis.value` in *event* to *value*.

`event:jbutton:which` *event* [Procedure]
Get `jbutton.which` from *event*.

`event:jbutton:button` *event* [Procedure]
Get `jbutton.button` from *event*.

`event:jbutton:state` *event* [Procedure]
Return the symbolic `jbutton.state` from *event*.

`event:jbutton:set-which!` *event value* [Procedure]
Set `jbutton.which` in *event* to *value*.

`event:jbutton:set-button!` *event value* [Procedure]
Set `jbutton.button` in *event* to *value*.

`event:jbutton:set-state!` *event value* [Procedure]
Set `jbutton.state` in *event* to *value*, a symbol or integer.

`event:jball:which` *event* [Procedure]
Get `jball.which` from *event*.

`event:jball:ball` *event* [Procedure]
Get `jball.ball` from *event*.

`event:jball:xrel` *event* [Procedure]
Get `jball.xrel` from *event*.

`event:jball:yrel` *event* [Procedure]
Get `jball.yrel` from *event*.

`event:jball:set-which!` *event value* [Procedure]
Set `jball.which` in *event* to *value*.

`event:jball:set-ball!` *event value* [Procedure]
Set `jball.ball` in *event* to *value*.

`event:jball:set-xrel!` *event value* [Procedure]
Set `jball.xrel` in *event* to *value*.

`event:jball:set-yrel!` *event value* [Procedure]
Set `jball.yrel` in *event* to *value*.

`event:jhat:which` *event* [Procedure]
Get `jhat.which` from *event*.

`event:jhat:hat` *event* [Procedure]
Get `jhat.hat` from *event*.

`event:jhat:value` *event* [Procedure]
Return `jhat.value` from *event* as a (possibly empty) list of symbols.

`event:jhat:set-which!` *event value* [Procedure]
Set `jhat.which` in *event* to *value*.

`event:jhat:set-hat!` *event value* [Procedure]
Set `jhat.hat` in *event* to *value*.

`event:jhat:set-value!` *event value* [Procedure]
Set `jhat.value` in *event* to *value*, a (possibly empty) list of symbols.

4.6 Resizes

`event:resize:w` *event* [Procedure]
Get `resize.w` from *event*.

`event:resize:h` *event* [Procedure]
Get `resize.h` from *event*.

`event:resize:set-w!` *event value* [Procedure]
Set `resize.w` in *event* to *value*.

`event:resize:set-h!` *event value* [Procedure]
Set `resize.h` in *event* to *value*.

4.7 Misc

`pump-events` [Procedure]
Gather events from input devices and update the event queue.

`evqueue-add` [*events...*] [Procedure]
Add `events` to the back of the event queue. Return the count of succesfully added events.

`evqueue-peek` *n mask* [*accumulate*] [Procedure]
Return a count (less than or equal to *n*) of events at the front of the event queue that match *mask*, without changing the queue. Optional arg *accumulate* if non-`#f` means to return the list of matched events, instead. If there are errors, return `#f`.

See [event-mask flags], page 40.

`evqueue-get` *n mask* [Procedure]
Return a list (of length at most *n*) of events at the front of the event queue that match *mask*, removing them from the queue. If there are errors, return `#f`.

See [event-mask flags], page 40.

`poll-event` [*event*] [Procedure]
Poll for events and return `#t` if there are any pending. Optional arg *event* specifies an event object (from `make-event`) to be filled in with the next event from the queue (if available).

`wait-event` [*event*] [Procedure]
Wait indefinitely for and return `#f` only if there were errors. Optional arg *event* specifies an event object (from `make-event`) to be filled in with the next event from the queue.

`push-event` *event* [Procedure]
Push *event* onto the queue. Return `#t` on success.

`set-event-filter` *filter full?* [Procedure]
Set the event filter to *filter*, or clear it if *filter* is `#f`. This is a procedure called with one arg, and whose return value, if non-`#f`, means to keep the event, otherwise discard it. If *full?* is `#f`, the arg the event type (a symbol), otherwise it is an event object.

`get-event-filter` [Procedure]
Return information on the current event filter, or `#f` if none is set. If there is a filter, the value is a pair with car the filter proc, and cdr `#f` if the proc takes an event type, or `#t` if the proc takes an event object.

`event-type-handling` *type* [*setting*] [Procedure]

Return `#t` if event *type* (see [event-type enums], page 41) is recognized and queued, or `#f` if it is ignored. If *setting* is specified, set the handling of *type* to the truth value of *setting* first.

`enable-unicode` [*enable-p*] [Procedure]

Return `#t` iff UNICODE keyboard translation is enabled. Optional arg *enable?* if non-`#f`, enables UNICODE keyboard translation, or disables it if `#f`.

`enable-key-repeat` *delay interval* [Procedure]

Enable or disable keyboard repeat. *delay* is the initial delay in ms between the time when a key is pressed, and keyboard repeat begins. *interval* is the time in ms between keyboard repeat events. If *delay* is 0, keyboard repeat is disabled. Return `#t` on success.

`get-key-state` [Procedure]

Return a list of pressed keys (see [keysym enums], page 41).

`get-mod-state` [Procedure]

Return the current key modifier state as a list of symbols.

`set-mod-state` *modstate* [Procedure]

Set the current key modifier state to *modstate*, a list of symbols. This does not change the keyboard state, only the key modifier flags.

`button?` *mask* [Procedure]

Return `#t` if buttons specified in *mask* are pressed, otherwise `#f`. *mask* is a symbol or a list of symbols from the set returned by `get-mouse-state`.

For backward compatibility, *mask* can also be the (integer) logior of the buttons, using mapping:

```
 1  left
 2  middle
 4  right
 8  wheel-up
16  wheel-down
32  x1
64  x2
```

For example, a value of 5 specifies both left and right buttons, equivalent to `(left right)`.

`mouse-bxy` [*relative*] [Procedure]

Return three values: a (possibly empty) list of symbols representing pressed mouse buttons (like `event:button:button`), and two integer coordinates *x* and *y*.

Optional arg `relative` non-`#f` means the coordinates are relative to the last time the underlying `SDL_GetRelativeMouseState` was called.

5 Joystick

`num-joysticks` [Procedure]
Return the number of joysticks.

`joystick?` *obj* [Procedure]
Return `#t` iff *obj* is a joystick object.

`joystick-name` [*n*] [Procedure]
Return the (string) name of the default joystick, or `#f`. Optional arg *n* specifies which joystick to check.

`joystick-open` [*n*] [Procedure]
Return a handle to the default joystick opened for use. Optional arg *n* specifies which joystick to open.

`joystick-opened?` [*n*] [Procedure]
Return `#t` iff the default joystick is opened. Optional arg *n* specifies which joystick to check.

`joystick-index` *joystick* [Procedure]
Return the index of *joystick*.

`joystick-num-axes` *joystick* [Procedure]
Return the number of axes for *joystick*.

`joystick-num-balls` *joystick* [Procedure]
Return the number trackballs for *joystick*.

`joystick-num-hats` *joystick* [Procedure]
Return the number of hats for *joystick*.

`joystick-num-buttons` *joystick* [Procedure]
Return number of buttons for *joystick*.

`joystick-update` [Procedure]
Update the state of all Joysticks.

`joystick-polling` [*setting*] [Procedure]
Return `#t` if joystick events are polled and queued (such that it is unnecessary to "manually" call `joystick-update`), otherwise `#f`. If *setting* is specified, set joystick events polling to the truth value of *setting* first.

`joystick-get-axis` *joystick axis* [Procedure]
For *joystick*, return state of *axis*.

`joystick-ball-xy` *joystick n* [Procedure]
Return relative motion of *joystick* trackball *n* as two values: `dx` and `dy` (both integers).

`joystick-get-hat` *joystick n* [Procedure]
For *joystick*, return state of hat *n*.

`joystick-get-button` *joystick n* [Procedure]
For *joystick*, return state of button *n*, a symbol, one of: `released` or `pressed`.

`joystick-close` *joystick* [Procedure]
Close a previously opened *joystick*.

6 CDROM

`cd?` *obj* [Procedure]
Return `#t` iff *obj* is a CDROM drive object.

`cd-num-drives` [Procedure]
Return the number of CDROM drives.

`cd-name` [*drive*] [Procedure]
Return a human-readable, system-dependent identifier (a string) for the CDROM, or `#f`. Optional arg *drive* is a number specifying which drive.

`cd-open` [*drive*] [Procedure]
Open the CDROM drive for access and return its handle. If the drive is unavailable, return `#f`. Optional arg *drive* is a number specifying which drive.

`cd-status` *cdrom* [Procedure]
Return the current status of the drive *cdrom* as a symbol (see [cdrom-state enums], page 40).

`cd-in-drive?` *cdrom* [Procedure]
Return `#t` iff there is a CD in drive *cdrom*.

`cd-get-num-tracks` *cdrom* [Procedure]
Return the number of tracks on the CD in drive *cdrom*.

`cd-get-cur-track` *cdrom* [Procedure]
Return the current track on the CD in drive *cdrom*.

`cd-get-cur-frame` *cdrom* [Procedure]
Return the current frame of the CD in drive *cdrom*.

`cd-nth-track-itlo` *cdrom* [*n*] [Procedure]
For CD in drive *cdrom*, return four values describing track *n* (zero if unspecified): `id`, `type`, `length` and `offset`, all integers except for `type`, which is a symbol, either `audio` or `data`.

`cd-play-tracks` *cdrom* [*start-track* [*start-frame* [*n-tracks* [*n-frames*]]]] [Procedure]
Play the given CD tracks in drive *cdrom*. Play the CD starting at *start-track* and *start-frame* for *ntracks* tracks and *nframes* frames. If both *ntrack* and *nframe* are 0, play until the end of the CD. This procedure will skip data tracks, and should only be called after calling `cd-status` to get track information about the CD. Return `#t` if successful.

`cd-play` *cdrom start length* [Procedure]
Play CD in drive *cdrom* from *start* frame for *length* frames. Return `#t` if successful.

`cd-pause` *cdrom* [Procedure]
Pause the CD in drive *cdrom*. Return `#t` if successful.

`cd-resume` *cdrom* [Procedure]
Resume (unpause) the CD in drive *cdrom*. Return `#t` if successful.

`cd-stop` *cdrom* [Procedure]
Stop the CD in drive *cdrom*. Return `#t` if successful.

`cd-eject` *cdrom* [Procedure]
Eject the CD from drive *cdrom*. Return `#t` if successful.

`cd-close` *cdrom* [Procedure]

Close the drive *cdrom*.

`cd-msf->frames` *m* [*s* [*f*]] [Procedure]

Return frames (an integer) computed fr *m*, second *s* and frame *f*. *s* and *f* are optional.

`frames-msf` *frames* [Procedure]

Break down *frames* (an integer) and return three values: `minute`, `second` and `frames` (all integers).

7 OpenGL

[todo]

8 TrueType

`ttf-init` [Procedure]
Initialize the SDL_ttf subsystem.

`load-font` *file ptsize* [Procedure]
Load a font from *file* with point size *ptsize*. Return a handle.

`font:style` *font* [Procedure]
Return the style of *font* (see [font-style flags], page 41). This font style is implemented by modifying the font glyphs, and doesn't reflect any inherent properties of the truetype font file.

`font:set-style!` *font style* [Procedure]
Set *font* style to *style* (see [font-style flags], page 41). This font style is implemented by modifying the font glyphs, and doesn't reflect any inherent properties of the truetype font file.

`font:height` *font* [Procedure]
Return the total height of *font*, usually equal to point size.

`font:ascent` *font* [Procedure]
Return the offset from the baseline to the top of *font*. This is a positive number.

`font:descent` *font* [Procedure]
Return the offset from the baseline to the bottom of *font*. This is a negative number.

`font:line-skip` *font* [Procedure]
Return the recommended spacing between lines of text for *font*.

`font:glyph-xXyYa` *font ch* [Procedure]
Return the metrics (dimensions) of a glyph as five values. The glyph is a *font*-specific rendering of char *ch*. Values are: `minx`, `maxx`, `miny`, `maxy` and `advance` (all integers).

`text-wh` *font text* [Procedure]
Return two values: `width` and `height` (both integers) representing the dimensions of the *font*-specific rendering of the string *text*.

`utf8-wh` *font text* [Procedure]
Return two values: `width` and `height` (both integers) representing the dimensions of the *font*-specific rendering of the UTF-8 string *text*.

`render-text` *font text fg* [*bg*] [Procedure]
Return a new surface containing the *font*-specific rendering of the *text* string. Third argument is the foreground color; optional fourth argument is the background color, or `#t` if the text is to be blended.

`render-utf8` *font text fg* [*bg*] [Procedure]
Return a new surface containing a *font*-specific rendering of the utf8 string *text*. Third argument is the foreground color; optional fourth argument is the background color, or `#t` if the text is to be blended.

`render-glyph` *font ch fg* [*bg*] [Procedure]
Return a new surface containing a *font*-specific rendering of the character *ch*. Third argument is the foreground color; optional fourth argument is the background color, or `#t` if the text is to be blended.

`ttf-quit` [Procedure]
Quit the SDL_ttf subsystem.

9 Audio

`open-audio` [*freq* [*format* [*stereo* [*chunksize*]]]] [Procedure]
Open the mixer with a certain audio format. Optional args *freq* (number), *format* (number), *stereo* (boolean) and *chunksize* (number) specify those aspects of the device. Return `#t` if successful.

`allocated-channels` *numchans* [Procedure]
Dynamically change the number of channels managed by the mixer to *numchans*. If decreasing the number of channels, the upper channels are stopped. Return the new number of allocated channels.

`device-ffc` [Procedure]
Return audio device parameters as three values: `frequency` (Hz), `format` (number of bits) and `channels` (number of allocated channels).

`load-music` *filename* [Procedure]
Load music data (.mod .s3m .it .xm) from *filename*. Return a new music object if successful, otherwise `#f`.

`load-wave` *filename* [Procedure]
Load wave data from *filename*. Return a new audio object if succesful, otherwise `#f`.

`reserve-channels` *num* [Procedure]
Reserve the first *num* channels (0 through *num*-1) for the application. In other words don't allocate them dynamically to the next sample if requested with a -1 value below. Return the number of reserved channels.

`group-channel` *channel* [*tag*] [Procedure]
Attach to *channel* a *tag*. A tag can be assigned to several mixer channels, to form groups of channels. If *tag* is not specified, or is -1, the tag is removed (actually -1 is the tag used to represent the group of all the channels). Return `#t` if successful.

`group-channels` *from to* [*tag*] [Procedure]
Assign channels in the range *from* through *to* to the default group. Optional arg *tag* specifies the group to use. Return `#t` if successful.

`group-available` [*tag*] [Procedure]
Return the first available channel in the default group of channels. Optional arg *tag* specifies the group to check.

`group-count` [*tag*] [Procedure]
Return the number of channels in the default group. Optional arg *tag* specifies the group to check.

`group-oldest` [*tag*] [Procedure]
Return the `"oldest"` sample playing in the default group of channels. Optional arg *tag* specifies the group to check.

`group-newer` [*tag*] [Procedure]
Return the `"most recent"` (i.e. last) sample playing in the default group of channels. Optional arg *tag* specifies the group to check.

`play-channel` *chunk* [*channel* [*loops* [*ticks* [*fade*]]]] [Procedure]
Play an audio *chunk* on a specific *channel*. If the channel is unspecified or is -1, play on the first free channel. If *loops* is specified and greater than zero, loop the sound that many times. If *loops* is -1, loop infinitely (~65000 times). If *ticks* is specified, stop after that number of ticks. If *fade* is specified, fade in over that number of milliseconds. Return which channel was used to play the sound.

`play-music` *music* [*loops* [*fade*]] [Procedure]
Play a *music* track. Optional args *loops* and *fade* are as in `play-channel`.

`volume` [*volume* [*which*]] [Procedure]
Return the current volume on the default channel. Optional arg *volume* (a number in the range 0-128) means set the volume to *volume* and return the original volume. Optional second arg *which* specifies a chunk or channel to check (or modify) instead of the default. If *volume* is non-`#f` and *which* is `#f`, modify all channels.

[Here is the original (perhaps clearer) docstring. —ttn]

Set the volume in the range of 0-128 of a specific channel or chunk. If the channel is unspecified or is -1, set volume for all channels. Return the original volume. If the volume is unspecified or is -1, just return the current volume.

`music-volume` [*volume*] [Procedure]
Return the current volume. Optional arg *volume* (a number in the range 0-128) means set the volume to *volume*.

`halt-channel` [*channel*] [Procedure]
Halt playing of the default channel. Optional arg *channel* specifies a channel to halt.

`halt-group` [*tag*] [Procedure]
Halt playing of the default group. Optional arg *tag* specifies the group to halt.

`halt-music` [Procedure]
Halt playing of the music.

`expire-channel` [*channel* [*ticks*]] [Procedure]
Turn off expiration for the default channel. Optional arg *channel* specifies a channel to change. Optional arg *ticks* (a number) means set the expiration delay to that many milliseconds, rather than turning it off.

`fade-out-channel` [*which* [*ms*]] [Procedure]
Halt a channel, fading it out progressively until silent. Optional arg *which* specifies a channel to halt. Second optional arg *ms* specifies the number of milliseconds the fading will take (default 0).

`fade-out-group` [*tag* [*ms*]] [Procedure]
Halt a group, fading it out progressively until silent. Optional arg *tag* specifies a group to halt. Second optional arg *ms* specifies the number of milliseconds the fading will take (default 0).

`fade-out-music` [*ms*] [Procedure]
Halt the music, fading it out progressively until silent. Optional arg *ms* specifies the number of milliseconds the fading will take (default 0).

`fading-music` [Procedure]
Return the fading status of the music, one of the symbols: `no`, `out`, `in`.

`fading-channel` [*which*] [Procedure]
Return the fading status (a symbol, see `fading-music`) of the default channel. Optional arg *which* selects which channel to check.

`pause` [*channel*] [Procedure]
Pause the default channel. Optional arg *channel* selects which channel to pause.

`resume` [*channel*] [Procedure]
Resume (unpause) the default channel. Optional arg *channel* selects which channel to resume.

`paused?` [*channel*] [Procedure]
Return `#t` if the default channel is paused. Optional arg *channel* selects a which channel to check.

`pause-music` [Procedure]
Pause the music.

`resume-music` [Procedure]
Resume (unpause) the music.

`rewind-music` [Procedure]
Rewind the music.

`paused-music?` [Procedure]
Return `#t` if the music is currently paused.

`playing?` [*channel*] [Procedure]
Return `#t` iff the default channel is playing. Optional arg *channel* selects which channel to check.

`playing-music?` [Procedure]
Return `#t` iff the music is currently playing.

`set-music-command` *command* [Procedure]
Stop music and set external music playback command to *command*, a string. As a special case, if *command* is `#f`, arrange to use internal playback, instead.

FWIW, the C header file for the following panning, distance and position procs says:

> Setting (channel) to MIX_CHANNEL_POST registers this as a posteffect, and the panning will be done to the final mixed stream before passing it on to the audio device.

`set-panning` *channel l r* [Procedure]
Set panning for (stereo) *channel* with *l* and *r*. Both *l* and *r* are integers 0–255, inclusive, where 0 is quietest and 255 is loudest.

To get "true" panning, use `(set-panning CH N (- 255 N))`.

`set-distance` *channel distance* [Procedure]
Set the "distance" of *channel* to *distance* (integer, 0–255). This controls the location of the sound with respect to the listener.

Distance 0 is overlapping the listener, and 255 is as far away as possible. A distance of 255 does not guarantee silence; in such a case, you might want to try changing the chunk's volume, or just cull the sample from the mixing process with `halt-channel`.

For efficiency, the precision of this effect may be limited (distances 1 through 7 might all produce the same effect, 8 through 15 are equal, etc).

Setting (distance) to 0 unregisters this effect, since the data would be unchanged.

`set-position` *channel angle distance* [Procedure]

Set the "position" of *channel* to *angle*, *distance*. In this polar coordinate, *angle* is in degrees (integer modulo 360), and *distance* is an integer 0–255 (and is treated as in proc `set-distance` – see notes there).

Angle 0 is due north, and rotates clockwise as the value increases. For efficiency, the precision of this effect may be limited (angles 1 through 7 might all produce the same effect, 8 through 15 are equal, etc).

Setting *angle* and *distance* to 0 unregisters this effect, since the data would be unchanged.

Additionally, the C header says:

> If the audio device is configured for mono output, then you won't get any effectiveness from the angle; however, distance attenuation on the channel will still occur. While this effect will function with stereo voices, it makes more sense to use voices with only one channel of sound, so when they are mixed through this effect, the positioning will sound correct. You can convert them to mono through SDL before giving them to the mixer in the first place if you like.

`close-audio` [Procedure]

Close the mixer, halting all playing audio.

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10.1 Graphics Primitives

`draw-point` *surface x y color* [Procedure]
On *surface*, draw a point at location *x*,*y* with color *color*.

`draw-hline` *surface x1 x2 y color* [Procedure]
On *surface*, draw a horizontal line segment from *x1*,*y* to *x2*,*y*, with color *color*.

`draw-vline` *surface x y1 y2 color* [Procedure]
On *surface*, draw a vertical line segment from *x*,*y1* to *x*,*y2*, with color *color*.

`draw-rectangle` *surface x1 y1 x2 y2 color* [*fill*] [Procedure]
On *surface*, draw a rectangle with opposite points *x1*,*y1* and *x2*,*y2*, with color *color*. Optional arg *fill* means to fill the rectangle as well.

`draw-rounded-rectangle` *surface x1 y1 x2 y2 rad color* [*fill*] [Procedure]
On *surface*, draw a rectangle with opposite points *x1*,*y1* and *x2*,*y2*, with rounded corners radius *rad* in color *color*. Optional arg *fill* means to fill the rectangle as well.

`draw-line` *surface x1 y1 x2 y2 color* [Procedure]
On *surface*, draw a line segment from *x1*,*y1* to *x2*,*y2*, with color *color*.

`draw-aa-line` *surface x1 y1 x2 y2 color* [Procedure]
On *surface*, draw an anti-aliased line segment from *x1*,*y1* to *x2*,*y2*, with color *color*.

`draw-thick-line` *surface x1 y1 x2 y2 width color* [Procedure]
On *surface*, draw a line segment from *x1*,*y1* to *x2*,*y2*, with thickness *width* in color *color*.

`draw-arc` *surface x y r start end color* [Procedure]
On *surface*, draw arc with center *x*,*y* and radius *r*, going from *start* to *end* (degrees), with color *color*.

If *start* is greater than *end*, the effective range of the arc is taken to be *end* to *start* (that is, these arguments are internally reversed).

`draw-circle` *surface x y r color* [*fill*] [Procedure]
On *surface*, draw a circle with center *x*,*y* and radius *r*, with color *color*. Optional arg *fill* means to fill the circle as well.

`draw-aa-circle` *surface x y r color* [Procedure]
On *surface*, draw an anti-aliased circle with center *x*,*y* and radius *r*, with color *color*.

`draw-ellipse` *surface x y rx ry color* [*fill*] [Procedure]
On *surface*, draw an ellipse with center *x*,*y* x-radius *rx*, y-radius *ry*, with color *color*. Optional arg *fill* means to fill the ellipse as well.

`draw-aa-ellipse` *surface x y rx ry color* [Procedure]
On *surface*, draw an anti-aliased ellipse with center *x*,*y*, x-radius *rx*, y-radius *ry*, with color *color*.

`draw-pie-slice` *surface x y rad start end color* [*fill*] [Procedure]
On *surface*, draw a pie slice with center *x*,*y* and radius *rad*, going from *start* to *end* (degrees), with color *color*. Optional arg *fill* means to fill the slice as well.

`draw-trigon` *surface x1 y1 x2 y2 x3 y3 color* [*fill*] [Procedure]
On *surface*, draw a triangle with vertices at *x1*,*y1*, *x2*,*y2* and *x3*,*y3*, with color *color*. Optional arg *fill* means to fill the triangle as well.

`draw-aa-trigon` *surface x1 y1 x2 y2 x3 y3 color* [Procedure]
On *surface*, draw an anti-aliased triangle with vertices at *x1*,*y1*, *x2*,*y2* and *x3*,*y3*, with color *color*.

`draw-polygon` *surface vx vy color* [*fill*] [Procedure]
On *surface*, draw a polygon whose points are specified by corresponding pairs from the s16 uniform vectors *vx* and *vy*, in color *color*. Optional arg *fill* means to fill the polygon as well.

`draw-aa-polygon` *surface vx vy color* [Procedure]
On *surface*, draw an anti-aliased polygon whose points are specified by corresponding pairs from the s16 uniform vectors *vx* and *vy*, in color *color*.

`draw-textured-polygon` *surface vx vy texture tdx tdy* [Procedure]
On *surface*, draw a polygon whose points are specified by corresponding pairs from the s16 uniform vectors *vx* and *vy*, filling from *texture* (a surface) with offset *tdx*, *tdy*.

`draw-bezier` *surface vx vy s color* [Procedure]
On *surface*, draw a bezier curve whose points are specified by corresponding pairs from the s16 uniform vectors *vx* and *vy*, with *s* steps in color *color*.

`draw-character` *surface x y c color* [Procedure]
On *surface* at position *x*,*y*, draw char *c* with *color* (a number).

`draw-string` *surface x y text color* [Procedure]
On *surface* at position *x*,*y*, draw string *text* with *color* (a number).

`font-rotation!` *rotation* [Procedure]
Set the rotation for glyphs drawn by `draw-character` and `draw-string` to *rotation* (an integer or symbol), one of:

```
0  none
1  clockwise
2  upside-down
3  counter-clockwise
```

10.2 Rotation / Zooming

`roto-zoom-surface` *surface angle* [*zoom* [*smooth*]] [Procedure]
Return a new surface made from rotating *surface* by *angle* degrees. Optional third arg *zoom* (default value 1.0) changes the size as well. Optional fourth arg *smooth* turns on anti-aliasing.

`roto-zoom-surface-xy` *surface angle* [*zoomx* [*zoomy* [*smooth*]]] [Procedure]
Return a new surface made from rotating *surface* by *angle* degrees. Optional third and fourth args *zoomx* and *zoomy* (default value 1.0 for both) changes the size as well. Optional fifth arg *smooth* turns on anti-aliasing.

`zoom-surface` *surface zoomx* [*zoomy* [*smooth*]] [Procedure]
Return a new scaled copy of *surface*. *zoomx* and *zoomy* specify the scaling factor. If omitted, *zoomy* defaults to *zoomx*. Optional fourth arg *smooth* turns on anti-aliasing.

`shrink-surface` *surface factorx factory* [Procedure]

Return a new shrunken copy of *surface*. *factorx* and *factory* are positive integers specifying the inverse scaling factor. For example, 2 means half size, 3 means one-third size, etc.

The returned surface is antialiased by "averaging the source box RGBA or Y information" and is in 32-bit RGBA format.

10.3 Managing Frame Rate

`make-fps-manager` [*n*] [Procedure]

Return a FPS manager object to be passed as the first arg to `fps-manager-set!`, `fps-manager-get` and `fps-manager-delay!`. Optional arg *n* specifies the value in Hz to initialize the object (default 30 if not specified).

`fps-manager-set!` *mgr n* [Procedure]

Arrange for FPS manager *mgr* to try to maintain a frame rate of *n* Hz. Return `#f` if not successful.

`fps-manager-get` *mgr* [Procedure]

Return the frame rate of FPS manager *mgr* in Hz, or `#f` if unsuccessful.

`fps-manager-delay!` *mgr* [Procedure]

Request an appropriate delay from FPS manager *mgr*.

10.4 RGBA Extras

`set-pixel-alpha!` *surface alpha* [Procedure]

If *surface* is 32-bit, set each pixel's alpha value to *alpha*, an integer 0-255, inclusive, and return `#t`. Otherwise, do nothing and return `#f`.

`blit-rgba` *src srect dst drect* [Procedure]

Blit from 32-bit surface *src* rectangle *srect* to 32-bit surface *dst* rectangle *drect*. Return `#t` if there are no problems.

Note that unlike `blit-surface` (see Chapter 3 [Video], page 6), all arguments must be fully specified. This restriction may be relaxed in the future.

10.5 Image Filtering

`imfi-mmx?` [*setting*] [Procedure]

If *setting* is `#t`, enable MMX instructions for the image filter procs (if possible); if `#f`, disable; otherwise do nothing. Return the (boolean) value of the setting afterwards.

`imfi-add` *src1 src2 dst* [Procedure]

D = saturation255 (S1 + S2).

`imfi-mean` *src1 src2 dst* [Procedure]

D = S1/2 + S2/2.

`imfi-sub` *src1 src2 dst* [Procedure]

D = saturation0 (S1 - S2).

`imfi-abs-diff` *src1 src2 dst* [Procedure]

D = | S1 - S2 |.

`imfi-mult` *src1 src2 dst* [Procedure]

D = saturation (S1 * S2).

`imfi-mulnor` *src1 src2 dst* [Procedure]
D = S1 * S2 (non-MMX).

`imfi-muldiv2` *src1 src2 dst* [Procedure]
D = saturation255 (S1/2 * S2).

`imfi-muldiv4` *src1 src2 dst* [Procedure]
D = saturation255 (S1/2 * S2/2).

`imfi-logand` *src1 src2 dst* [Procedure]
D = S1 & S2.

`imfi-logior` *src1 src2 dst* [Procedure]
D = S1 | S2.

`imfi-div` *src1 src2 dst* [Procedure]
D = S1 / S2 (non-MMX).

`imfi-not` *src dst* [Procedure]
D = !S.

`imfi-add-c` *src dst c* [Procedure]
D = saturation255 (S + C).

`imfi-add-c-to-half` *src dst c* [Procedure]
D = saturation255 (S/2 + C).

`imfi-sub-c` *src dst c* [Procedure]
D = saturation0 (S - C).

`imfi-ashr` *src dst n* [Procedure]
D = saturation0 (S >> N).

`imfi-lshr` *src dst n* [Procedure]
D = saturation0 ((uint) S >> N).

`imfi-mul-c` *src dst c* [Procedure]
D = saturation255 (S * C).

`imfi-ashr-mul-c` *src dst n c* [Procedure]
D = saturation255 ((S >> N) * C).

`imfi-bshl` *src dst n* [Procedure]
D = (S << N).

`imfi-lshl` *src dst n* [Procedure]
D = ((uint) S << N).

`imfi-ashl` *src dst n* [Procedure]
D = saturation255 (S << N).

`imfi-binarize` *src dst t* [Procedure]
D = (S < T ? 0 : 255).

`imfi-clip` *src dst tmin tmax* [Procedure]
D = (Tmin <= S <= Tmax) ? 255 : 0.

`imfi-normalize-linear` *src dst cmin cmax nmin nmax* [Procedure]
D = saturation255 ((Nmax - Nmin) / (Cmax - Cmin) * (S - Cmin) + Nmin).

11 Miscellaneous Utilities

These are available in module `(sdl misc-utils)`.

`exact-truncate` *number* [Procedure]

Return the exact truncation (rounding to zero) of *number*. This is "safer" than simply `inexact->exact` for some Guile versions.

```
(define scale 0.180281690140845)
(inexact->exact scale)
  ⇒ 3247666210160131/18014398509481984 ; Guile 1.8.7
  ⇒ 0                                  ; Guile 1.4.x
(exact-truncate scale)
  ⇒ 0
```

`call-with-clip-rect` *rect thunk* [Procedure]

Set default clip rect to *rect*, call *thunk*, and restore it. *thunk* is a procedure that takes no arguments.

`rotate-square` *square angle* [Procedure]

Return a new surface made by rotating *square* by *angle* degrees. The square retains its original size.

`rectangle-closure` [*rect*] [Procedure]

Return a closure that manages a single rectangle object. Calling the closure with no args returns the rectangle object. Otherwise, the messages `#:w`, `#:h`, `#:x` and `#:y` return the rectangle's width, height, horizontal offset and vertical offset, respectively; and the messages `#:w!`, `#:h!`, `#:x!` and `#:y!`, followed by an integer, update the rectangle's width, height, horizontal offset and vertical offset, respectively.

Optional arg *rect* specifies a rectangle object to manage instead of allocating a new one.

`rectangle<-geometry-string` *spec* [Procedure]

Return a rectangle made from parsing the *geometry string spec*, which typically has the form `WxH+X+Y`, where `+X+Y` is optional (defaults to "+0+0"), and `W`, `H`, `X` and `Y` are integers. Actually, the `+` can also be a `-`. If *spec* cannot be parsed, return `#f`. Examples:

```
(rectangle<-geometry-string "42x43+44+45")
⇒ #<SDL-Rect 42x43+44+45>

(rectangle<-geometry-string "42x43-10-20")
⇒ #<SDL-Rect 42x43+-10+-20>

(rectangle<-geometry-string "42x43")
⇒ #<SDL-Rect 42x43+0+0>

(rectangle<-geometry-string "42")
⇒ #f
```

Note that the print representation of a rectangle always has "+". The term "geometry string" derives from the X Window System, where many programs take a `--geometry` (or `-g` for short) command-line option.

`poll-with-push-on-timeout-proc` *timeout slice* [*get-timeout-events*] [Procedure]

Return a procedure `P` that checks the event queue for *timeout* ms, polling every *slice* ms. If an event arrives during that time, return `#t`. Otherwise return `#f`. Optional arg *get-timeout-events* is either a list of events to be pushed on the queue in the case of timeout, or a thunk

to be called that produces such a list. If *get-timeout-events* is specified, return the result of another event queue polling. (This may still be `#f` if the pushed events are masked in some way.)

`P` is called with a single arg, a pre-constructed event object. This interface is congruent with that of `wait-event` and `poll-event`. See Chapter 4 [Events], page 12.

`rect<-surface` *surface* [*x y*] [Procedure]

Return a new rectangle with the same width and height as *surface*. Optional second and third arg (which must appear together or not at all) specifies the *x* and *y* components, respectively, to use instead of the default of 0 (zero).

`copy-rectangle` *rect* [*modify args...*] [Procedure]

Return a new rectangle copied from *rect*.

Optional second arg *modify* specifies which portions, if any, to modify using the values in the rest *args*. If *modify* is `#:xy`, the two *args* specify new `x` and `y` values. If *modify* is `#:wh`, the two *args* specify new `w` and `h` values.

```
rect
⇒ #<SDL-Rect 3x4+1+2>

(copy-rectangle rect)
⇒ #<SDL-Rect 3x4+1+2>

(copy-rectangle rect #:xy 11 22)
⇒ #<SDL-Rect 3x4+11+22>

(copy-rectangle rect #:wh 33 44)
⇒ #<SDL-Rect 33x44+1+2>
```

`copy-surface` *surface* [*clip*] [Procedure]

Create a new surface and blit *surface* onto it. The new surface has the same pixel format as *surface*. Return the new surface.

Optional second arg *clip* is a rectangle describing the portion of *surface* to copy (default is the entire surface).

`ignore-all-event-types-except` [*types...*] [Procedure]

Arrange to ignore all event types except those in *types* (see [event-type enums], page 41). As a special case, if *types* is `#f`, arrange to not ignore any event types (all are enabled).

In the following procs, those named ending with `/3p` return three values, each a thunk (unless specified otherwise) handling the three-phase calling convention, namely *init*, *next*, and *done*.

```
(call-with-values (lambda () (foo/3p ...))
  (lambda (init! foo! done!)
    (init!)
    (let loop ((continue? (foo!)))
      (and continue? (loop (foo!))))
    (done!)))
```

Note that `foo!` returns non-`#f` to indicate that the looping is not yet complete.

`fader/3p` *sec realized location image replacement* [Procedure]

Return three values, each a thunk, that can be used to loop for *sec* seconds, blitting onto *realized* at *location* (a rectangle or `#f` to indicate the origin) the alpha-composition of *image* and its *replacement* (both surfaces), to effect a *fade-in* of *replacement* over *image*. The alpha

value is directly proportional to the time between the "next!" phase call and the "init!" phase call.

realized may be either a surface, in which case at the end of each loop it is shown via `update-rect`; or a pair whose CAR is a surface and whose CDR is a thunk that should do the showing.

Note that *location* is used for blitting, so its width and height should match those of *image* and *replacement*.

`toroidal-panner/3p` *surface dx dy* [*sub* [*batch?*]] [Procedure]

Return three values, the first a procedure of one arg, the other two thunks, that can be used to toroidally pan *surface* by *dx* and *dy* pixels. This means that data disappearing from one side of the surface (left, right, top, bottom) is rotated to appear at the other side (right, left, bottom, top). The `init!` procedure takes one arg *count*, the number of pans to do.

Positive *dx* moves surface data to the left (panning right), and likewise, positive *dy*, up (panning down).

Optional third arg *sub* is a rectangle object specifying a subset of the surface. The default is to pan the entire surface.

Optional fourth arg *batch?* non-`#f` means to call `update-rect` on the (sub)surface after all the panning is done. The default is to update the surface after each pan. Batch mode is useful for implementing variable-speed panning, for example:

```
(define (pan dir)
  (call-with-values (lambda ()
                      (toroidal-panner/3p screen
                                          (* dir 21)
                                          (* dir 12)
                                          #f #t))
    (lambda (init! next! done!)
      (lambda (count)
        (init! count)
        (let loop ((continue? (next!)))
          (and continue? (loop (next!))))
        (done!)))))

(define pan-away (pan  1))
(define pan-back (pan -1))
(define ramp (map 1+ (append (make-list 21 0)
                             (identity (iota 12))
                             (reverse! (iota 12))
                             (make-list 21 0))))
(for-each pan-away ramp)
(for-each pan-back ramp)
```

12 Simple Closures

This chapter documents module `(sdl simple)`.

This module provides some simple abstractions to introduce common Guile-SDL programming idioms. Although the interfaces are documented, they are *permanently alpha*, that is, subject to change w/o notice. Instead of relying on the stability of the interface, you are encouraged to look at the implementation as a model for creating customized abstractions.

`simple-canvas` *init? w h bpp* [*flags. . .*] [Procedure]

Return a *canvas closure* that accepts a few simple messages. If *init?* is non-`#f`, initalize the SDL video subsystem first. *w*, *h*, and *bpp* specify the width, height, and bits-per-pixel, respectively. *flags* are symbols to set the video mode. If omitted, the default is `hw-surface` and `doublebuf`.

The closure, if called without arguments, returns the video surface. Otherwise, the following messages are recognized:

`#:rect` Return a rectangle the width and height of the canvas.

`#:set-bg! r g b`
Set the background color (used for clearing) to the color specified by *r*, *g* and *b* (integers 0-255), respectively. By default it is black (all values zero).

`#:clear!` Fill the canvas with the background color.

`#:w`
`#:h`
`#:w/h` Return width, height, or a cons of width and height, respectively.

`#:resize! new-width new-height`
Request that the canvas dimension be changed to *new-width* by *new-height*. Return a rect that reflects the actual dimension.

`simple-stylus` *init? filename size r g b* [Procedure]

Return a *stylus closure* that accepts a few simple messages. If *init?* is non-`#f`, initialize the SDL TTF support first. *filename* specifes the .ttf file to load and `size` the size. *r*, *g* and *b* are integers (0-255) specifying the color. The closure recognizes the following messages:

`#:set-font! filename size`
`#:set-color! r g b`
Change the font or color, respectively.

`#:set-canvas! surface`
Set the surface on which the `#:write!` command renders.

`#:render text [color [bg]]`
Return a surface of *text* rendered using the default font, size, color and size. Optional second arg *color* specifies another color to use. Optional third arg *bg* specifies a background mode: `#f` (default) for "solid"; `#t` for "blended"; a color to use that color.

`#:write! where text [color [bg]]`
Similar to #:render, but also blit the surface onto the canvas at the rectangle position specified by *where*. The width and height components of *where* are updated by side effect.

`simple-vpacked-image` *filename* [*canvas*] [Procedure]

Return a *vpacked image closure* that accepts a few simple messages. "Vpacked" means multiple vertically-abutted images of dimensions NxN (at the top) through Nx1 (at the bottom), stored in a single image file. *filename* specifies the file and optional arg *canvas* specifies a surface for blitting. The closure recognizes the following messages:

`#:set-canvas! surface`
: Change the canvas.

`#:rects`
: Return the vector of rectangles of length N+1 (the element at index zero is `#f`) corresponding to areas on the image representing the smaller sub-images. The element at index I is a rectangle of dimension IxI.

`#:blit! i rect`
: Blit the sub-image *i* (an integer 1 <= I <= N), onto the canvas. *rect* specifies a rectangle to blit to.

13 Excuses

Here are some notes on interface elements from `/usr/include/SDL/*.h` that are not yet wrapped by Guile-SDL. As things progress elements will be removed until an irreducible set remains.

Interface elements have zero or more *attributes*, some of which indicate irreducibility (such as `probably-never`). Following the attribute groupings are specific notes on those elements that are particular in some way. The presentation order is not significant.

13.1 Categories

For brevity, we omit the `SDL_` prefix in the groupings. There are two speical cases: `(N)` stands for `SDLNet_`, and `(M)` stands for `Mix_`.

`internal`

These interface elements are exposed in the C header but should not be exposed to Scheme, for reasons of either safety or inutility.

```
SoftStretch  LowerBlit  UpperBlit
VideoInit  VideoQuit  AudioQuit  AudioInit
(M)GetChunk
```

`probably-never`

Don't expect to see these exposed to Scheme, ever!

```
SoftStretch  SaveBMP_RW  LoadBMP_RW
VideoInit  VideoQuit  InitQuickDraw  RegisterApp
SetModuleHandle  getenv  putenv
ClearError  SetError  WriteBE64  WriteLE64
WriteBE32  WriteLE32  WriteBE16  WriteLE16
ReadBE64  ReadLE64  ReadBE32  ReadLE32
ReadBE16  ReadLE16  CloseAudio  UnlockAudio
LockAudio  MixAudio  ConvertAudio  BuildAudioCVT
FreeWAV  LoadWAV_RW  PauseAudio  GetAudioStatus
OpenAudio  AudioDriverName  AudioQuit
AudioInit  (M)GetMusicHookData  (M)GetChunk
```

`doze`

Windoze support, blech.

```
SaveBMP_RW  LoadBMP_RW  RegisterApp
SetModuleHandle
```

`threading-implications`

Will (any :–) ttn ever be ready for parallelism?

```
RemoveTimer  AddTimer  SetTimer  KillThread
WaitThread  GetThreadID  ThreadID
CreateThread  CondWaitTimeout  CondWait
CondBroadcast  CondSignal  DestroyCond
CreateCond  SemValue  SemPost  SemWaitTimeout
SemTryWait  SemWait  DestroySemaphore  CreateSemaphore
DestroyMutex  mutexV  mutexP  CreateMutex
```

`todo`

To be completed by Guile-SDL 1.0 (that is, if All Goes Well).

```
KillThread  WaitThread  GetThreadID
ThreadID  CreateThread  CondWaitTimeout
```

CondWait CondBroadcast CondSignal
DestroyCond CreateCond SemValue
SemPost SemWaitTimeout SemTryWait
SemWait DestroySemaphore CreateSemaphore
DestroyMutex mutexV mutexP CreateMutex
(N)Init (N)Quit (N)ResolveHost (N)ResolveIP
(N)TCP_Open (N)TCP_Accept (N)TCP_GetPeerAddress
(N)TCP_Send (N)TCP_Recv (N)TCP_Close
(N)AllocPacket (N)ResizePacket (N)FreePacket
(N)AllocPacketV (N)FreePacketV (N)UDP_Open
(N)UDP_Bind (N)UDP_Unbind (N)UDP_GetPeerAddress
(N)UDP_SendV (N)UDP_Send (N)UDP_RecvV
(N)UDP_Recv (N)UDP_Close (N)AllocSocketSet
(N)AddSocket (N)DelSocket (N)CheckSockets
(N)SocketReady (N)FreeSocketSet (N)Write16
(N)Write32 (N)Read16 (N)Read32 (M)SetPostMix
(M)HookMusic (M)HookMusicFinished (M)ChannelFinished
(M)RegisterEffect (M)UnregisterEffect (M)UnregisterAllEffects
(M)SetReverb (M)SetReverseStereo (M)SetMusicPosition
(M)SetSynchroValue (M)GetSynchroValue

`rwops`

Read-write operations.

FreeRW AllocRW RWFromMem RWFromConstMem
RWFromFile

`macos`

Macintosh support, meh.

InitQuickDraw

`endian`

These concern little- vs. big-endian i/o. Perhaps Guile already provides decent alternatives.

WriteBE64 WriteLE64 WriteBE32 WriteLE32
WriteBE16 WriteLE16 ReadBE64 ReadLE64
ReadBE32 ReadLE32 ReadBE16 ReadLE16

`use-mixer-instead`

These elements are obsoleted by the module `(sdl mixer)`.

CloseAudio UnlockAudio LockAudio
MixAudio ConvertAudio BuildAudioCVT
FreeWAV LoadWAV_RW PauseAudio GetAudioStatus
OpenAudio AudioDriverName AudioQuit
AudioInit

`hook`

Callback from SDL to Scheme code. Can be tricky to get right...

(M)SetPostMix (M)HookMusic (M)HookMusicFinished (M)ChannelFinished
(M)RegisterEffect (M)UnregisterEffect (M)UnregisterAllEffects

13.2 Specific Notes

`SDL_SoftStretch`

SDL_video.h sez:

```
          /* Not in public API at the moment - do not use! */

SDL_CreateRGBSurfaceFrom
          not sure what this is useful for

SDL_GL_UpdateRects
          arglist: (int numrects, SDL_Rect* rects)

          we can either try to map uniform vectors (of smobs),
          or introduce a ‘RectVector’ smob.

SDL_VideoInit
          actually, SDL_video.h sez:
          /* These functions are used internally, and should not be used unless you
           * have a specific need to specify the video driver you want to use.
           * You should normally use SDL_Init() or SDL_InitSubSystem().
           * ...
           */

SDL_VideoQuit
          see note for ‘SDL_VideoInit’

SDL_Linked_Version
          SDL_version.h sez:
          /* This function gets the version of the dynamically linked SDL library.
             it should NOT be used to fill a version structure, instead you should
             use the SDL_Version() macro.
           */

SDL_GetWMInfo
          return value for proc ‘get-wm-info’ does not presently
          include the ‘lock_func’ and ‘unlock_func’ hooks.
          support for those will be added after i figure out
          how to "thunkify" them.

SDL_GetKeyName
          why do we want to know the name of a key?

SDL_AudioQuit
          SDL_audio.h sez:
          /* These functions are used internally, and should not be used unless you
           * have a specific need to specify the audio driver you want to use.
           * You should normally use SDL_Init() or SDL_InitSubSystem().
           */

SDL_AudioInit
          see note for ‘SDL_AudioQuit’

SDLNet_AddSocket
          there are also:
          #define SDLNet_TCP_AddSocket
          #define SDLNet_UDP_AddSocket

SDLNet_DelSocket
          there are also:
          #define SDLNet_TCP_DelSocket
          #define SDLNet_UDP_DelSocket
```

```
Mix_GetMusicHookData
          If (when) ‘Mix_HookMusic’ is added, it will not support "user data".
          It’s better to use object properties for that.
```

Appendix A Stashes

There are 21 stashes (11 enums, 10 flags).

Distribution of symbols count:

```
      2     5 =========================          min: 2
      3     3 ===============                    max: 231
      4     1 =====                            mean:   17.0
      5     4 ====================           median: 5.0
      7     2 ==========
      8     1 =====
     11     1 =====
     15     1 =====
     17     1 =====
     18     1 =====
    231     1 =====
```

Distribution of symbol lengths:

```
      1    26 =============                     min: 1
      2    19 ==========                        max: 17
      3    23 ============                     mean: 6.5126
      4    38 ====================           median: 7.0
      5    28 ==============
      6    31 ================
      7    28 ==============
      8   103 ====================================================
      9    18 =========
     10    13 =======
     11     4 ==
     12    10 =====
     13     3 ==
     14     2 =
     15     8 ====
     17     3 ==
```

`activity-change` [2 enums]

`lost`	`gained`

`alpha-limit` [2 enums]

`transparent`	`opaque`

`application-state` [3 flags]

`mousefocus`	`inputfocus`	`active`

`cd-track-type` [2 enums]

`audio`	`data`

`cdrom-state` [5 enums]

`error`	`stopped`	`paused`
`tray-empty`	`playing`	

`event-mask` [18 flags]

Note that these are a proper superset of those in the `event-type` enums, below.

active	mouse-button-up	joy-button-up
key-down	mouse	joy
key-up	joy-axis-motion	quit
key	joy-ball-motion	sys-wm
mouse-motion	joy-hat-motion	video-resize
mouse-button-down	joy-button-down	video-expose

`event-type` [15 enums]

Note that these are a proper subset of those in the `event-mask` flags, above.

active	mouse-button-up	joy-button-up
key-down	joy-axis-motion	quit
key-up	joy-ball-motion	sys-wm
mouse-motion	joy-hat-motion	video-resize
mouse-button-down	joy-button-down	video-expose

`fading-status` [3 enums]

no	out	in

`font-rotation` [4 enums]

none	upside-down
clockwise	counter-clockwise

`font-style` [5 flags]

normal	italic	strikethrough
bold	underline	

`grab-mode` [3 enums]

query	off	on

`init` [8 flags]

timer	cdrom	no-parachute
audio	joystick	event-thread
video	everything	

`joystick-hat-position` [5 flags]

centered	right	left
up	down	

`keyboard-modifier` [11 flags]

L-shift	L-alt	num
R-shift	R-alt	caps
L-ctrl	L-meta	mode
R-ctrl	R-meta	

`keyboard/button-state` [2 enums]

released	pressed

`keysym` [231 enums]

Note that digits begin with `D-` so that they are unambiguously (to `read`) symbols.

```
a b c d e f g h i j k l m n o p q r s t u v w x y z
D-0 ... D-9
```

```
ampersand   backquote   capslock   delete   end
asterisk    backslash   caret      dollar   equals
at          backspace   clear               escape
            break       colon               euro
                        comma               exclaim
                        compose

f1 ... f15

hash   insert
help
home

kp-0 ... kp-9

kp-plus         kp-equals
kp-minus        kp-period
kp-multiply     kp-enter
kp-divide

left  right  up  down

L-alt  L-ctrl  L-meta  L-shift  L-super
R-alt  R-ctrl  R-meta  R-shift  R-super

L-bracket  R-bracket
L-paren    R-paren

less  greater

menu      pagedown   question   scrollock   tab
minus     pageup     quote      semicolon
mode      pause      quotedbl   slash       underscore
numlock   period                space       undo
          plus       return     sysreq
          power
          print

world-0 ... world-95
```

`mouse-button` [7 flags]

```
left            wheel-up        x1
middle          wheel-down      x2
right
```

`mouse-button` [7 enums]

```
left            wheel-up        x1
middle          wheel-down      x2
right
```

`overlay` [5 flags]

Although these should be enums, these are putative flags due to a limitation in the implementation[1]. Procs that use them enforce enums-ish usage, anyway; a list of symbols results in an error.

`YV12`	`YVYU`	`UYVY`
`YUY2`	`IYUV`	

`palette` [2 flags]

`logical`	`physical`

`video` [17 flags]

`sw-surface`	`no-frame`	`prealloc`
`hw-surface`	`hw-accel`	`any-format`
`opengl`	`src-colorkey`	`hw-palette`
`async-blit`	`rle-accel-ok`	`doublebuf`
`opengl-blit`	`rle-accel`	`fullscreen`
`resizable`	`src-alpha`	

[1] For speed, we use immediate integers (aka *fixnums*) for enums, but those are not wide enough on a 32-bit system to hold the overlay values. Probably this should be rectified prior to release as it represents a semi-regression. OTOH, it's not like anyone is actually using `create-yuv-overlay` anyway...

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Version 1.3, 3 November 2008

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