Rendering SVG graphics with libSDL

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What is libSDL?

Simple DirectMedia Layer library

GNU LGPL license

Multi-platform:

- Linux, *BSD, Solaris, IRIX, QNX
- Windows, Windows CE
- Mac OS X, Mac OS
- Amiga, iPhone, Dreamcast, Atari ST, AIX, RISC OS, SymbianOS, OS/2

What is libSDL? (cont'd)

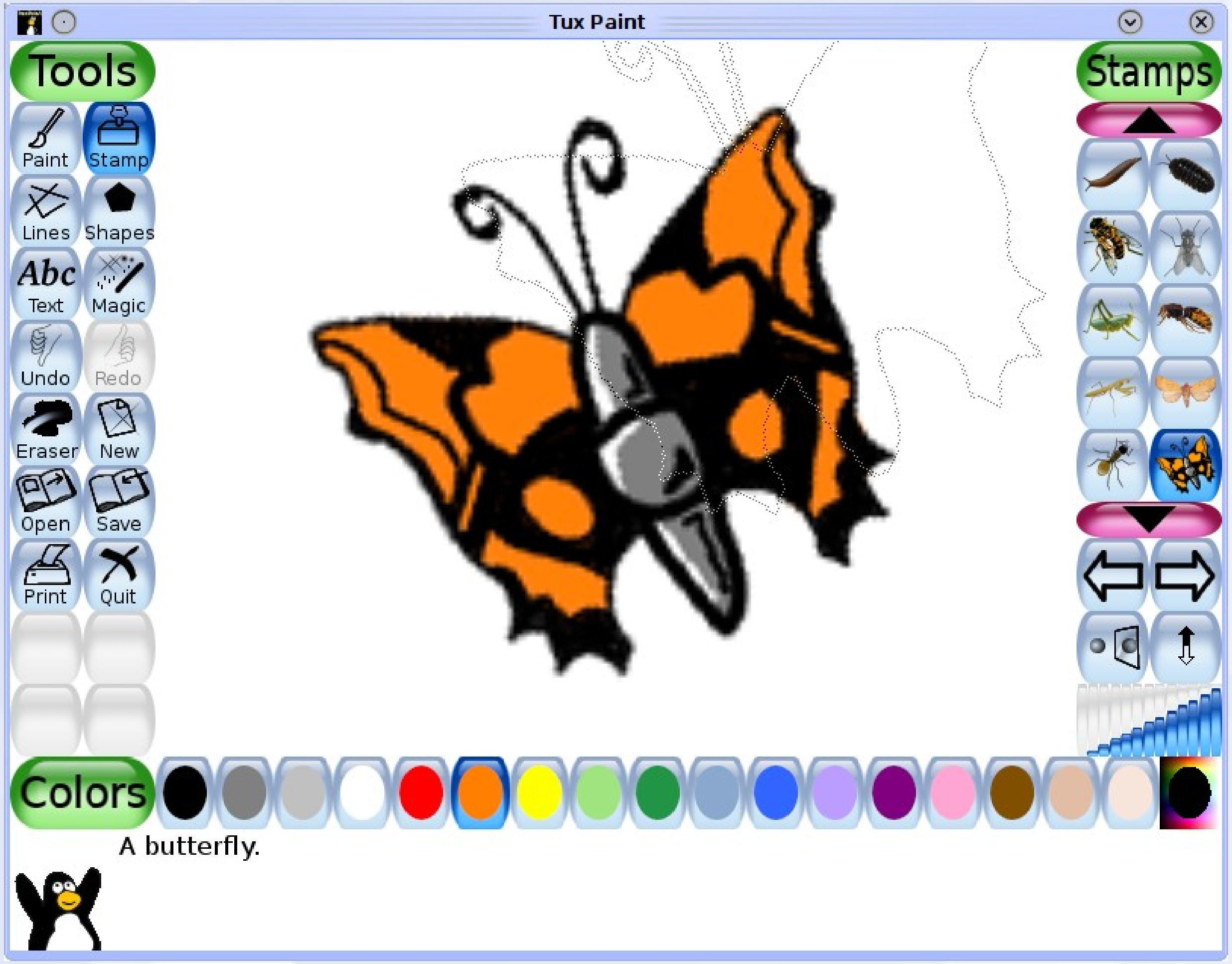
- Written in C
- Works with C++
- Bindings to: Ada, C#, D, Eiffel, Erlang, Haskell, Java, Lisp, Lua, ML, Objective C, Pascal, Perl, PHP, Python, Ruby, Smalltalk, Tcl and more...
- Used in open source and commercial games

What is libSDL (cont'd)

Images in libSDL

- SDL has built-in BMP loading capabilities
- ”SDL_image” add-on library allows loading many more bitmap formats:
  - GIF, JPEG, LBM, PCX, PNG, PNM, TGA, TIFF, XCF, XPM, XV
- Notice no SVG...

Why *I* needed SVGs



Tux Paint! (My pet project)

Why *I* needed SVGs (cont'd)

Tux Paint!

- Open source drawing program for kids
- Includes ”Stamps” feature to place pre-drawn art and photographs into pictures

”Stop” by Jarno K., Finland, 2007

How Tux Paint got SVG love:

I had a lot of time commuting on Amtrak...

Photo: snty-tact on Wikipedia; GFDL, cc-by-sa-2.5
http://en.wikipedia.org/wiki/File:Amtrak_California.JPG

A quick dance with libraries...

- Step 1: **svg**, **cairo** and **svg-cairo** libraries
  - Available on the version of Debian GNU/Linux I was running at the time
  - Was deprecated by the time that Debian version stablized
- Step 2: Re-write using **rsvg-2** and **cairo**
- Happy inconvenience: Older, less-perfect SVG libraries allow us to support SVG on older platforms (e.g., RedHat Linux 9)

How it's done (the modern way)

- Initialize:

```
rsvg_init();
```

- Open the SVG image file:

```
rsvg_handle = rsvg_handle_new_from_file(file,
                                         &err);
```

- Acquire its dimensions:

```
rsvg_handle_get_dimensions(rsvg_handle,
                           &dimensions);
```

- Determine its pixel dimensions:

```
rwidth = dimensions.width;
rheight = dimensions.height;
```

How it's done (cont'd)

- Decide how to scale it to fit in Tux Paint's canvas:

```
scale = pick_best_scape(rwidth, rheight,
                        r_canvas.w, r_canvas.h);
   /* An internal Tux Paint function, also used w/ PNG stamps */
```

- Apply the scale:

```
width = ((float) rwidth * scale);
height = ((float) rheight * scale);
```

- Create a buffer into which we render the SVG drawing:

```
stride = width * 4; /* 4 bytes/pixel (32bpp RGBA) */
image = calloc(stride * height, 1);
```

- Use it as a Cairo surface

```
cairo_surf = cairo_image_surface_create_for_data(
                 image, CAIRO_FORMAT_ARGB32,
                 width, height, stride);
```

How it's done (cont'd)

- Create a new Cairo object:
  `cr = cairo_create(cairo_surf);`
- Give it the scale value (so it fits within our scaled buffer):
  `cairo_scale(cr, scale, scale);`
- Tell RSVG to render the SVG into the Cairo buffer:
  `rsvg_handle_render_cairo(rsvg_handle, cr);`
- All done rendering!
  `cairo_surface_finish(cairo_surf);`

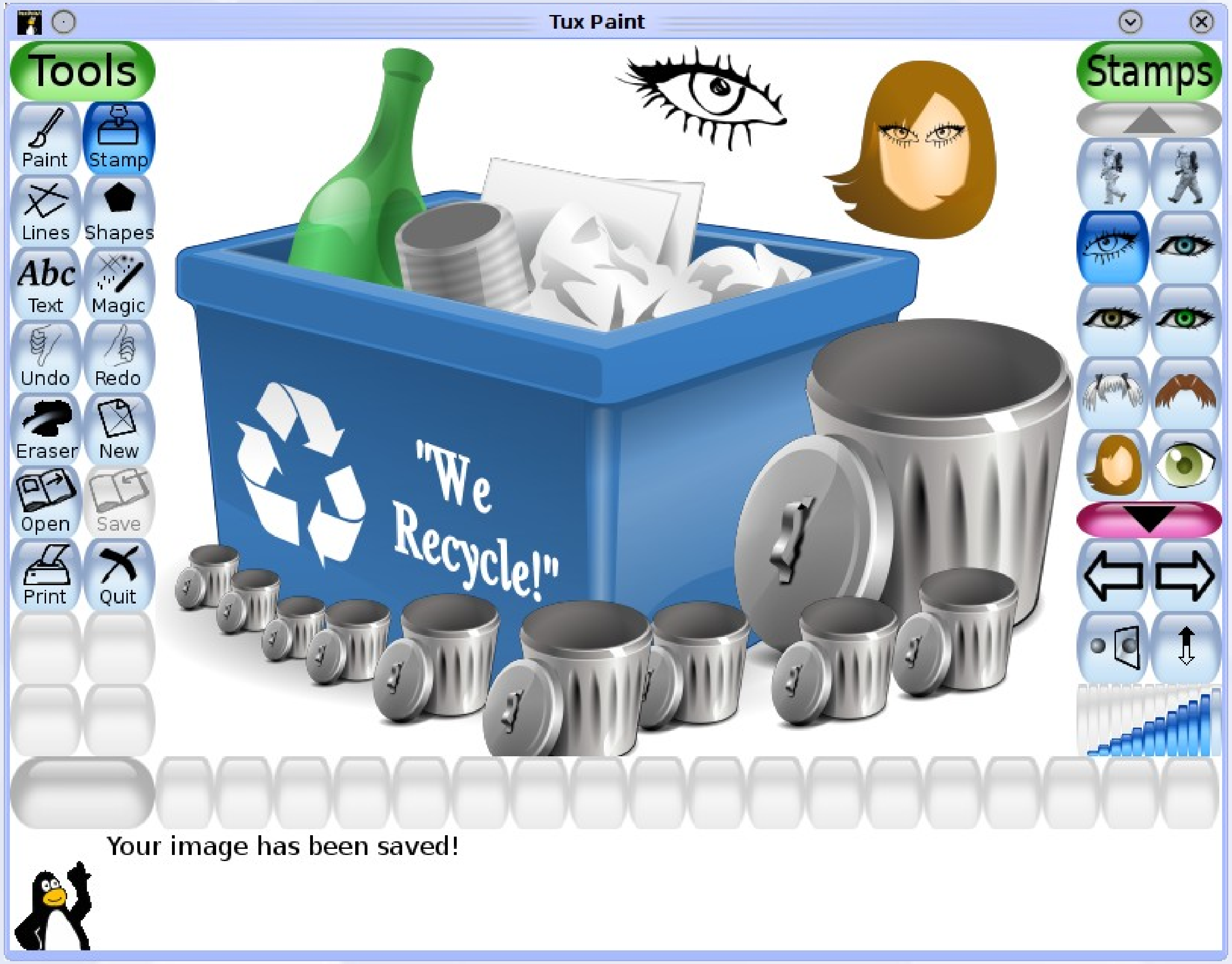
How it's done (cont'd)

- Create an SDL surface to pass back to Tux Paint:

```
rmask = 0x00ff0000;
gmask = 0x0000ff00;
bmask = 0x000000ff;
amask = 0xff000000;
   /* (Notice it matches CAIRO_FORMAT_ARGB32) */
sdl_surface = SDL_CreateRGBSurfaceFrom(
                  (void*) image,
                  width, height,
                  32 /* 4 bytes/pixel = 32bpp */,
                  stride,
                  rmask, gmask, bmask, amask);
```

- Of course, there's also the error checking and clean-up...

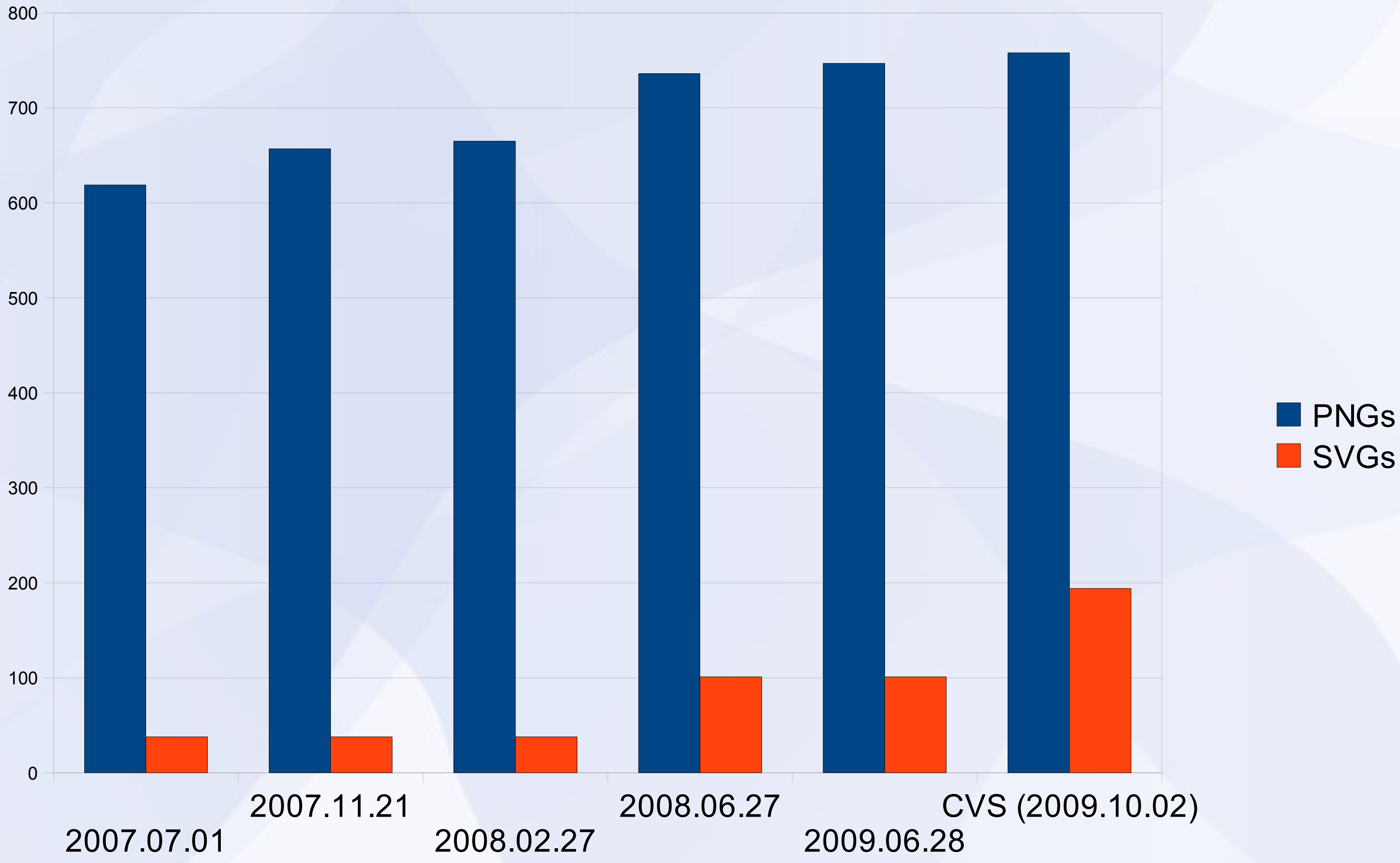
The Result!



Your image has been saved!

Tux Paint
Tools
Paint
Stamp
Lines
Shapes
Abc
Text
Magic
Stamps
Recycle
ve
cycle!"

SVG adoption in Tux Paint Stamps (versus PNG)



Links for Info & Downloads:

- Simple DirectMedia Layer library (libSDL)
  http://www.libsdl.org/
- GNOME SVG library (librsvg)
  http://librsvg.sourceforge.net/
- Cairo library
  http://www.cairographics.org/
- Tux Paint
  http://www.tuxpaint.org/
  (find these slides under ”Events”)