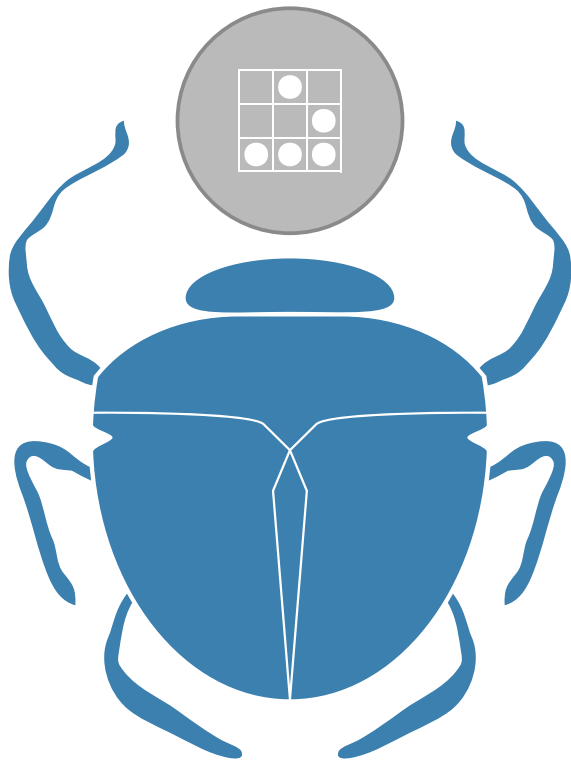




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Making Graphics Easy to Print



Carl Worth

linux.conf.au

2005-04-22

<http://cairographics.org>



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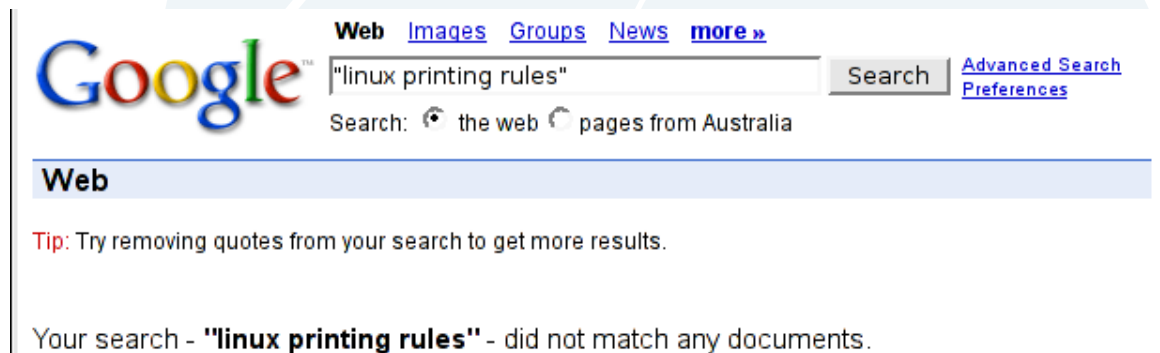
Web

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Linux printing sucks



Sucks-to-rules quotient: ∞



Pieces of the problem

Rendering

- 🐞 Graphics, text, fonts
- 🐞 Rasterization
- 🐞 Formats (PDF, PostScript, etc.)

Plumbing

- 🐞 Printer discovery, configuration
- 🐞 Network transfer, queuing
- 🐞 Format conversion



Rendering requirements

- 🐞 Adequate imaging model
 - 🐞 Must match modern application needs
- 🐞 Consistent display/print output
 - 🐞 Really requires a common API



Prior work

XPrint

- 🐞 Unified display/print API

- 🐞 Obsolete imaging model

libgnomeprint

- 🐞 Separate display and print APIs

- 🐞 Straddles rendering/plumbing layers



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Cairo backends

Unified display/print interface. Supporting:

 X Window System (Render)

 OpenGL (glitz)

 Mac OS X (Quartz)

 In-memory images

 Postscript and PDF






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Cairo imaging model

-  Paths, strokes, fills (PostScript)
-  Porter/Duff image compositing (PDF, Render)
-  Clipping, masking, gradients



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Cairo architecture

Application

Cairo

Rendering System

Output Device

Font System

Operating System



Cairo API example

```
/* L */
cairo_move_to (cr, 0, 0);
cairo_line_to (cr, 0, 80);
cairo_line_to (cr, 50, 80);

/* C */
cairo_move_to (cr, 110 + 40 * cos (M_PI / 3), 40 + 40 * sin(M_PI / 3));
cairo_arc (cr, 110, 40, 40, M_PI / 3, -M_PI / 3);

/* A */
cairo_move_to (cr, 160, 80);
cairo_curve_to (cr, 160, -30, 210, -30, 210, 80);

cairo_stroke (cr);
```



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Example output

LCn



PS proof-of-concept

One giant image per page

Pro

 Overcomes PostScript limitations

Cons

 Piggy-backs on image backend

 Output does not scale well

 None too kind to the network



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New PDF backend

- 🐞 First vector-based backend in cairo
- 🐞 Many thanks to Kristian Høgsberg



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Proposed meta-surface

- 🐞 Cairo operations stored logically
- 🐞 Enables “real” PostScript backend
- 🐞 Makes PDF surfaces first-class citizens
- 🐞 Allows vector-based patterns



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Who's playing with cairo?

 Dia

 Evince (xpdf)

 GTK+/Pango

 Mozilla

 Scribus

 Squeak

 Swfdec



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What's happening

- 🐞 The Great API Shakeup
 - 🐞 Getting things right before 1.0
 - 🐞 Nearly complete (days not weeks)
- 🐞 Performance work
 - 🐞 Tessellation
 - 🐞 Rasterization
 - 🐞 Composition



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Demonstration

Roadster, by Ian McIntosh

<http://linuxadvocate.org/projects/roadster/>