

All Your Fonts ARE...

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What is Pango

- Text rendering engine
- Text layout engine
- Unicode-based
- Modular
- Internationalized (not localized!)
- Abstract, Portable, Multi-backend
- Efficient!

Pango API

- High-level:
 - PangoLayout
- Low-level:
 - pango_itemize
 - pango_break
 - pango_shape

PangoLayout

Simple layout object. (Demo)

pango_itemize()

Breaks a piece of text into segments with consistent directional level, font, attributes, and shaping engine.

pango_break()

Determines possible line, word, and character breaks for a string of Unicode text.

pango_shape()

text and the corresponding PangoAnalysis structure returned from pango_itemize(), convert the characters into glyphs.

Engines

- Defined in modules
- May be built included, or dynamic
- Lang Engines: used in `pango_break()`
- Shape Engines: used in `pango_shape()`

Characters vs. Glyphs

- Unicode UTR#17: Character Encoding Model
- Distinction required for quality rendering of most scripts, but emphasized in so-called “complex” scripts, i.e. Arabic, Indic, ...
- OpenType, AAT, SIL Graphite

PangoFontDescription

- Data structure to represent a font description (surprise!)
- Contains fields like “family name”, “font size”, “style”, “variant”, “stretch”.
- `from_string(“DejaVu Sans Bold 24”)`
- Or using generic family names: “Sans 12”

Pango Backends

- X
- Win32
- FT2 (FreeType 2)
- Xft
- Cairo
 - CairoFc
 - CairoWin32
 - CairoATSUI

Itemizing

- Input: text, font description, attributes
- For each character, find the best matching language
- Find the best font and shaping engine to use for the (character, language) pair, using the backend fontmap implementation

FreeType, fontconfig, Xft, cairo

- FreeType: Render font glyphs into bitmaps
- Fontconfig: Map font descriptions (aka patterns) into available fonts
- Xft: Render (and cache) FreeType-generated bitmaps into an X server
- Cairo: Render (and cache) FreeType-generated bitmaps into a cairo surface (among other things)

Fontconfig

- Patterns: Pretty similar to a PangoFontDescription conceptually, but a lot more complete(/-x)
- Request pattern and font pattern
- FcFontMatch():
 - [behdad@home fonts]\$ fc-match sans
 - DejaVuSans.ttf: "DejaVu Sans" "Book"

Match Pattern has 16 elts (size 32)

family: "sans"(w)
slant: 0(i)(s)
weight: 100(i)(s)
width: 100(i)(s)
size: 12(f)(s)
pixelsize: 12.5(f)(s)
hintstyle: 3(i)(s)
hinting: FcTrue(s)
verticallayout: FcFalse(s)
autohint: FcFalse(s)
globaladvance: FcTrue(s)
dpi: 75(f)(s)
scale: 1(f)(s)
lang: "en-US"(s)
fontversion: 2147483647(i)(s)
embeddedbitmap: FcTrue(s)

Best match (scoring index 9) 0 Pattern has 17 elt

family: "DejaVu Sans"(s)
familylang: "en"(s)
style: "Book"(s)
stylelang: "en"(s)
slant: 0(i)(s)
weight: 80(i)(s)
width: 100(i)(s)
foundry: "unknown"(s)
file: "/home/behdad/.fonts/dejavu-ttf-2.2/Dej
index: 0(i)(s)
outline: FcTrue(s)
scalable: FcTrue(s)
charset: set(s)
lang: aa|af|ast|ava|ay|bam|be|bg|bi|bin|br|b
nds|nl|nn|no|ny|oc|om|os|pl|pt|rm|ro|ru|sah|se|se
fontversion: 144179(i)(s)
capability: "otlayout:DFLT otlayout:cyril otlay
fontformat: "TrueType"(s)

The Truth About Fontconfig

- Sort
- Pruning
- FcFontSort():
 - [behdad@home fonts]\$ fc-match --sort sans
 - DejaVuSans.ttf: "DejaVu Sans" "Book"
 - Vera.ttf: "Bitstream Vera Sans" "Roman"
 - n019003l.pfb: "Nimbus Sans L" "Regular"
 - roya.ttf: "Roya" "Regular"

So Why Should I Select a Font?

- You shouldn't!
- Just choose the main font
- Or use a font alias
- Font configuration:
 - `/etc/fonts/fonts.conf`
 - `/etc/fonts/conf.d`
 - `~/.fonts.conf`

```
<alias>
  <family>sans-serif</family>
  <prefer>
    <family>Luxi Sans</family>
    <family>Albany AMT</family>
    <family>Bitstream Vera Sans</family>
    <family>Verdana</family>
    <family>Arial</family>
    <family>Nimbus Sans L</family>
    <family>Helvetica</family>
    <family>KacstQura</family>
    <family>Nachlieli</family>
    <family>Lohit Bengali</family>
    <family>Lohit Gujarati</family>
    <family>Lohit Hindi</family>
    <family>Lohit Punjabi</family>
    <family>Lohit Tamil</family>
    <family>Sazanami Gothic</family>
    <family>Kochi Gothic</family>
    <family>□□ □□□□ </family>
    <family>MgOpen Modata</family>
    <family>FreeSans</family>
  </prefer>
</alias>
```

Just Works

- ...only if the fonts don't have crappy glyphs...
- ...or if they do, they don't mix crappy glyphs with quality glyphs...
- ...or we're screwed!
- Examples: Free Sans, Code2000, <put your favorite font here>

Huh, Done!

A handwritten-style graphic consisting of a large, thick black letter 'Q' followed by a question mark and an exclamation point. The 'Q' has a small tail at the bottom left. The question mark and exclamation point are also drawn with thick black lines, with the exclamation point having a long, upward-pointing stem.