All Your Fonts ARE...

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GUADEC
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 elts (size 17)
  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/DejaVuSans.ttf"(s)
  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|bs|bua|ca|ce|ch|co|cs|cy|da|de|el|en|eo|es|et|eu|fi|fj|fo|fr|fur|fy|gd|gl|gv|haw|ho|hr|hu|ia|ibo|id|ie|ik|io|is|it|kaa|ki|kk|kl|ku|kum|kv|kw|ky|la|lb|lez|ln|lt|lv|mg|mh|mk|mo|mt|nb|nds|nl|nn|no|ny|oc|om|os|pl|pt|rm|ro|ru|sah|se|se|sl|sm|sma|smj|smn|so|sq|sr|sv|sw|tk|tn|to|tr|ts|tt|tyv|uk|ven|vo|vot|wa|wen|wo|xh|yap|zu(s)
  fontversion: 144179(i)(s)
  capability: "otlayout:DFLT otlayout:cyrl otlayout:grek otlayout:latn"(s)
  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 Sans</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>ਮੌਪ੍ਰਥੀ</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!