openSUSE Conference

Upscaling retro/bitmap fonts

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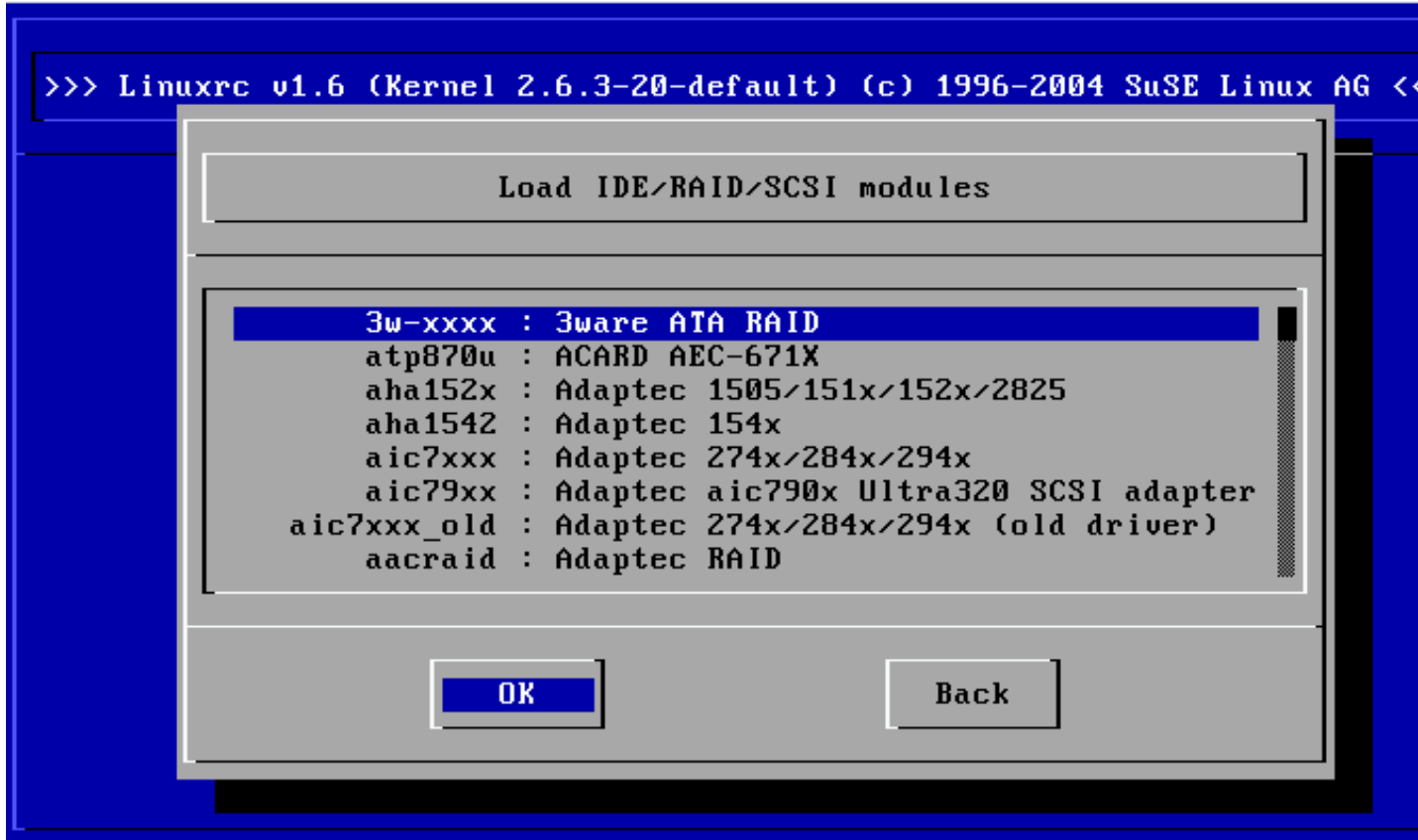
2023-06-27

Classic system default fonts

Goals

- Want to use retro fonts in today's (mostly graphical) environments

- Explore improving the looks of low-resolution fonts

Convert all the things

- Roadblocks to just using bitmap fonts

  - xterm, kmscon: no automatic upscaling

  - pango/harfbuzz: removed PCF format in 2019

  - vgacon: limited to 16×32-sized glyphs

  - inkscape: can't render OTB

- TTF/OTF with outline glyphs best supported form

Approaching this with

- potrace

- HQx, xBRZ

- �

- N2

potrace/inkscape

- [default settings only!]
  Input with low pixelcount:
  too freestyle about thickness, inconsistent angles

- Input with artificially increased pixelcount:
  too faithful about staircase effect

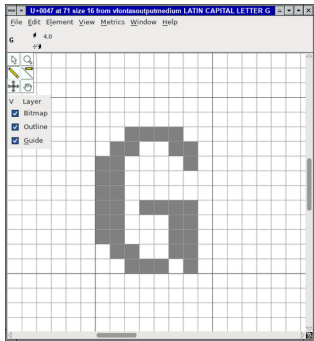original   traced   bitmap scaled 3x
then traced

HQx / xBRZ

- Produces *bitmap* output, smushes 1px protrusions (crossbar in 'f'), current limit is 6× zoom
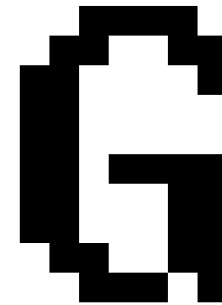
we'll do it ourselves

- Turn pixels into 4 oriented connected edges, then remove edge overlaps, and remove excess leftover vertices
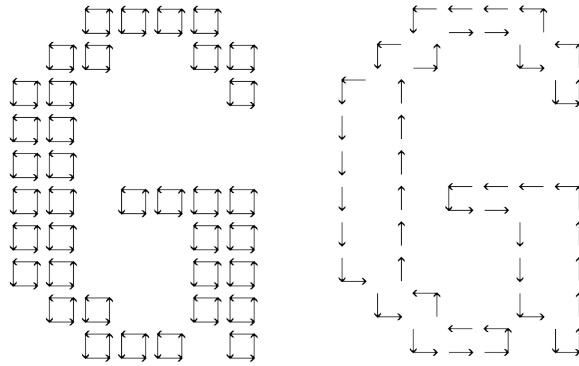
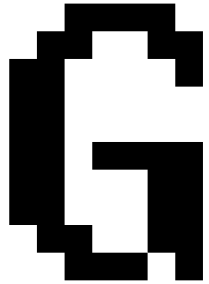bitmap form | visualization w/gaps: cubes. edges removed. | final glyph

- CLI: `vfontas ... -savesfd ...`
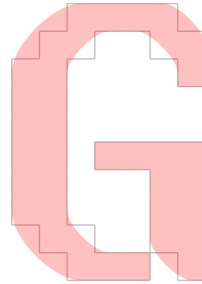
- save as OTF, �, profit

Addressing rough edge

- Identify staircase patterns and modify outline

bearable when
small enough
A24 A18 A12
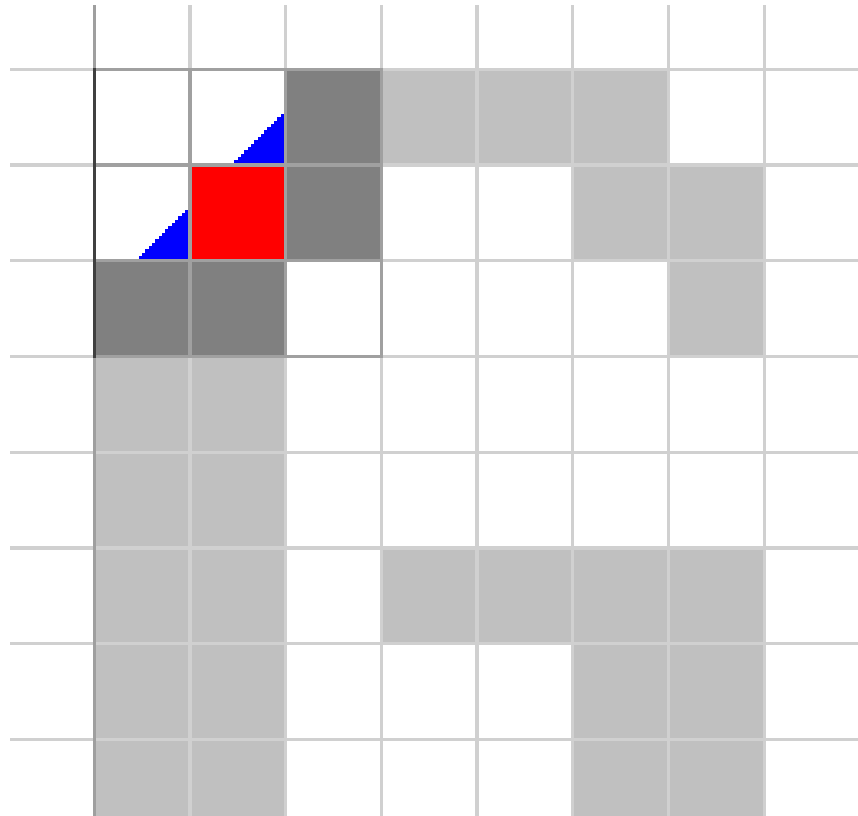
acceptable across
wider size range
A24 A18 A12

inspired by "Nouveau IBM"
font from 2009

I don't know, Rick,
it looks like "Chicago"

Staircase detection & repair

- simliar to many filters: analyzing each pixel and its surroundings (e.g. 3×3 window)

- If the window contains a stair pattern, add/delete some triangles in the vector copy
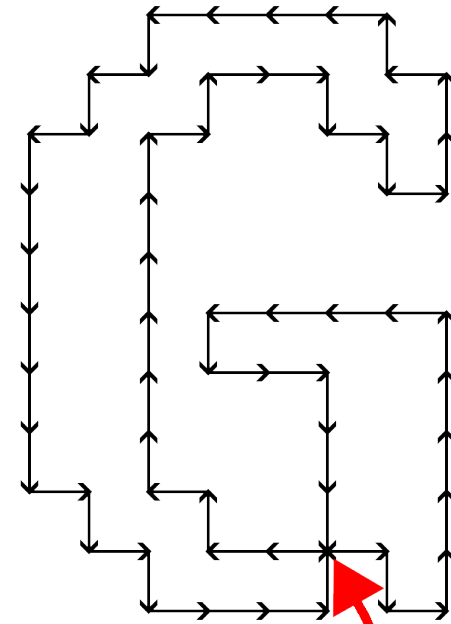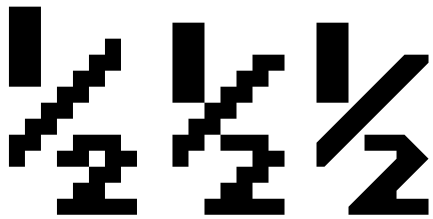
- CLI: `vfontas ... -saven1 ...`

- 'f' stem problem again

Staircase detector, try 2

- Follow the outline, analyze a window of edges instead

- Nudge vertices/ replace edges

- CLI: `vfontas ... -saven2 ...`
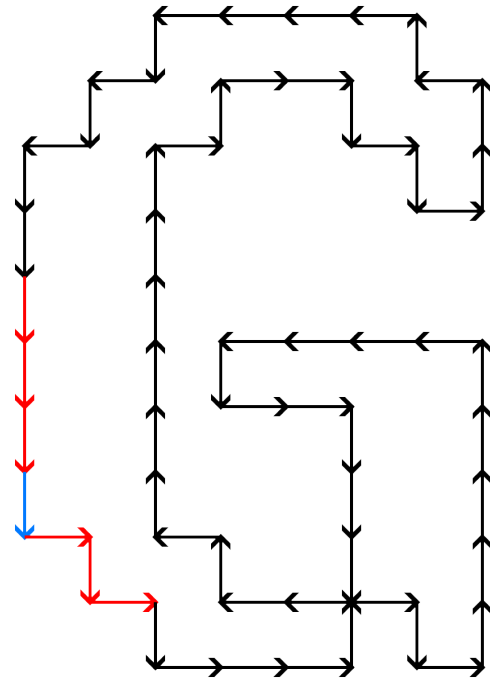
Current limits

- Ambiguous point locations — connect or don't connect?

½ ½ ½   **GG**

isthmus

Thanks for your attention

- Fontpacks, analysis (writeups), sources…
  https://inai.de/projects/consoleet/
  zypper se consoleet

- More smoothedged font specimens for this slide

- Terminus (32px) comparison before & after: