

**METAFUN**

**simple fonts**

context 2020 meeting

# Metafonts

- Because MetaPost is based on METAFONT it make sense to use of for making fonts.
- Making a font is an art in itself, something that is actually proven by many bad looking fonts, but we have plenty of choice nowadays.
- We tend to use free fonts and often being made by volunteers we can hardly have any demands.
- So, instead of complaining (which is not nice anyway) we can try to (at least temporary) come up with a solution ourselves.
- We're actually talking about missing glyphs here and MetaPost can be of help.
- Also keep in mind that we always had this option or variants of it in ConT<sub>E</sub>Xt, it's just that we can make nicer interfaces now.
- So, don't expect something spectacular.

# What is is not

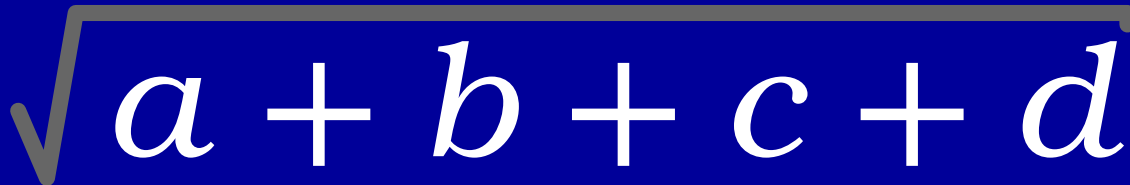
Years ago mechanisms were added to MkIV to come up with more fancy shapes in for instance math. Actually Alan needed it and I wanted a root symbol to look like school times.

```
1 \useMPlibrary[mat]
2 \setupmathradical[color=darkgray,alternative=mp]
3 % \definemathradical [sqrt] [mp=minifun::math:radical:default]
```

So:

```
1 \scale[height=2cm]{$ \sqrt {a+b+c+d} $}
```

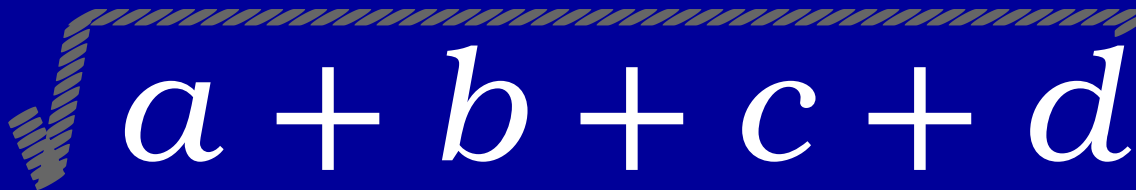
Gives:


$$\sqrt{a + b + c + d}$$

And with:

```
1 \startuniqueMPgraphic{minifun::math:radical:default}  
2 draw  
3   math_radical_simple(OverlayWidth,OverlayHeight,OverlayDepth,OverlayOffset)  
4   withpen pencircle  
5     xscaled (20overlayLineWidth)  
6     yscaled (10overlayLineWidth/4)  
7     rotated 30  
8   dashed evenly  
9   withcolor OverlayLineColor ;  
10 \stopuniqueMPgraphic
```

We get



Also think of stackers:

```
1 \setupmathstackers [both] [color=darkgray,alternative=mp]  
2 \setupmathstackers [top] [color=darkgray,alternative=mp]  
3 \setupmathstackers [bottom] [color=darkgray,alternative=mp]
```

$\overline{a+b+c+d}$     $\underline{a+b+c+d}$     $\overline{\underline{a+b+c+d}}$

$\overline{a+b+c+d}$     $\underline{a+b+c+d}$     $\overline{\underline{a+b+c+d}}$

$\overbrace{a+b+c+d}$     $\underbrace{a+b+c+d}$     $\overbrace{\underbrace{a+b+c+d}}$

$\overline{a+b+c+d}$     $\underline{a+b+c+d}$     $\overline{\underline{a+b+c+d}}$

$\overleftarrow{a+b+c+d}$     $\overrightarrow{a+b+c+d}$

$\overleftarrow{\underline{a+b+c+d}}$     $\underline{\overrightarrow{a+b+c+d}}$

But, these are just overlays and nothing special: we simply don't use the normal font route not fancy Lua tricks either (in principle MkII could do this). I might upgrade it some day (no real demand so far, just fun stuff).

# Real fonts

- For text we need an efficient way to define extra shapes.
- We don't really want inline graphics every time we use a glyph.
- We also want to cut and paste properly.
- Basically the fact that we drop in shapes should be hidden.
  
- We use the same (generic) subsystem that is also used for color fonts, bitmap emoji, svg fonts, etc.
- Shapes end up as Type3 fonts. These have some specific properties and limitations, but we can actually make Unicode fonts.
- The system is not burdened by much overhead and most happens at embedding time.

```
1 \definefont[DemoFontA][Serif*default @ 10pt]
2 \definefont[DemoFontB][Serif*default @ 12pt]
3 \definefont[DemoFontC][Serif*default @ 14pt]
4 \definefont[DemoFontD][SerifBold*default @ 14pt]

\startlines
2 \DemoFontA first\endash second\emdash third\char"2015\relax fourth
3 \DemoFontB first\endash second\emdash third\char"2015\relax fourth
4 \DemoFontC first\endash second\emdash third\char"2015\relax fourth
5 \DemoFontD first\endash second\emdash third\char"2015\relax fourth
6 \stoptlines

first–second—thirdfourth
first–second—thirdfourth
first–second—thirdfourth
first–second—thirdfourth
```

```
1 \definefontfeature[exampleone][metapost=symbolsone]
2 \definefont[DemoFontA][Serif*default,exampleone @ 10pt]
3 \definefont[DemoFontB][Serif*default,exampleone @ 12pt]
4 \definefont[DemoFontC][Serif*default,exampleone @ 14pt]
5 \definefont[DemoFontD][SerifBold*default,exampleone @ 14pt]
```

first—second—third—fourth

first—second—third—fourth

first—second—third—fourth

**first—second—third—fourth**



```

1 \startMPcalculation{simplefun}
2
3   vardef QuotationDashOne =
4     draw image (
5       interim linecap := squared ;
6       save l ; l := 0.2 ;
7       draw (1/2,3) -- (10-1/2,3) withpen pencircle scaled l ;
8     )
9   enddef ;
10
11   lmt_registerglyphs [
12     name      = "symbolstone",
13     units     = 10,
14     usecolor  = true,
15     width    = 10,
16     height   = 3.1,
17     depth    = 0,
18   ] ;
19
20   lmt_registerglyph [
21     category = "symbolstone",
22     unicode  = "0x2015",
23     code     = "QuotationDashOne ;"
24   ] ;
25
26 \stopMPcalculation

```

```
1 \definefontfeature[exampletwo][metapost=symbolstwo]
2 \definefont[DemoFontA][Serif*default,exampletwo @ 10pt]
3 \definefont[DemoFontB][Serif*default,exampletwo @ 12pt]
4 \definefont[DemoFontC][Serif*default,exampletwo @ 14pt]
5 \definefont[DemoFontD][SerifBold*default,exampletwo @ 14pt]
```

first—second—third—fourth

first—second—third—fourth

first—second—third—fourth

**first—second—third—fourth**

```

1 \startMPcalculation{simplefun}
2
3   vardef QuotationDashTwo =
4     draw image (
5       interim linecap := squared ;
6       save l ; l := 0.4 ;
7       string weight ; weight := getparameter "mpsfont" "parentdata" "shared" "rawdata" "metadata" "weight" ;
8       if      weight = "semibold" : l := l * 2;
9       elseif weight = "bold"      : l := l * 3; fi
10      draw (1/2,3) -- (10-1/2,3) withpen pencircle scaled l
11      withcolor yellow ;
12    )
13  enddef ;
14
15  lmt_registerglyphs [
16    name      = "symbolstwo",
17    units     = 10,
18    usecolor  = false,
19    width     = 10,
20    height    = 3.1,
21    depth     = 0,
22  ] ;
23
24  lmt_registerglyph [
25    category = "symbolstwo",
26    unicode  = "0x2015",
27    code     = "QuotationDashTwo ;"
28  ] ;
29
30 \stopMPcalculation

```

# More examples

We give some examples (these are also in the modules). Overloading math symbols:

```
meta-imp-kindergarten.mkx1
```

Extending fonts with Don Knuths dices and tiles (symbols, ligatures, proper Unicode):

```
meta-imp-gamesymbols.mkx1
```

An implementation of Don Knuths ThirtySix font in various variants (color, random, shapes):

```
meta-imp-threesix.mkx1
```