
A new unit for LMTX: The dk

Hans Hagen

At the ConT_EXt 2021 meeting I mixed my T_EX talks with showing some of the (upcoming) LuaMetaT_EX source code. One evening we had a extension party where a new unit was implemented, the dk. This event was triggered by a remark Hraban [Ramm] made on the participants list in advance of the meeting, where he pointed to a Wikipedia article from which we quote:

In issue 33, Mad published a partial table of the “Potrzebie System of Weights and Measures”, developed by 19-year-old Donald E. Knuth, later a famed computer scientist. According to Knuth, the basis of this new revolutionary system is the potrzebie, which equals the thickness of Mad issue 26, or 2.2633484517438173216473 mm [...].

So, as the result of that session, the source code now has this comment:

We support the Knuthian Potrzebie, cf. en.wikipedia.org/wiki/Potrzebie, as the dk unit. It was added on 2021-09-22 exactly when we crossed the season during an evening session at the 15th ConT_EXt meeting in Bassenge (Boirs) Belgium. It took a few iterations to find the best numerator and denominator, but Taco Hoekwater, Harald Koenig and Mikael Sundqvist figured it out in this interactive session. The error messages have been adapted accordingly and the scanner in the Lua `tex` library also handles it. One dk is 6.43985pt. There is no need to make MetaPost aware of this unit because there it is just a numeric multiplier in a macro package.

When compared to the already present units the dk nicely fills a gap:

unit	points	scaled	visual
sp	0.00002	1	
pt	1.0	65536	
bp	1.00374	65781	
dd	1.07	70124	
mm	2.84526	186467	█
dk	6.43985	422042	█
pc	12.0	786432	█
cc	12.8401	841489	█
cm	28.45274	1864679	█
in	72.26999	4736286	█

Deep down, the unit scanner uses a numerator and denominator in order to map the given value onto the internally used scaled points, so the relevant snippet of C code is:

```
*num = 49838; // 152940;
*denom = 7739; // 23749;
return normal_unit_scanned;
```

The impact on performance of scanning an additional unit can be neglected because the scanning code is a bit different from the code in LuaT_EX and (probably the) other engines anyway.

Under consideration are a few extra units in the `relative_unit_scanned` category that we see in CSS: `vw` (relative to the `\hsize`), `vh` (relative to the `\vsize`), maybe a percentage (but of what) and `ch` (width of the current zero digit character). As usual with T_EXies, once it’s there it will be (ab)used.

◇ Hans Hagen
<http://pragma-ade.com>