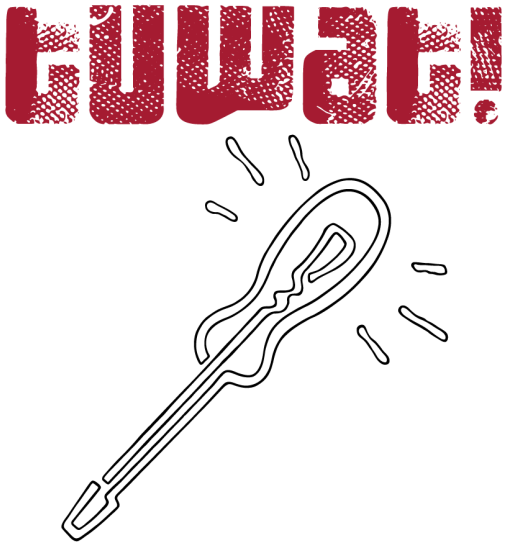
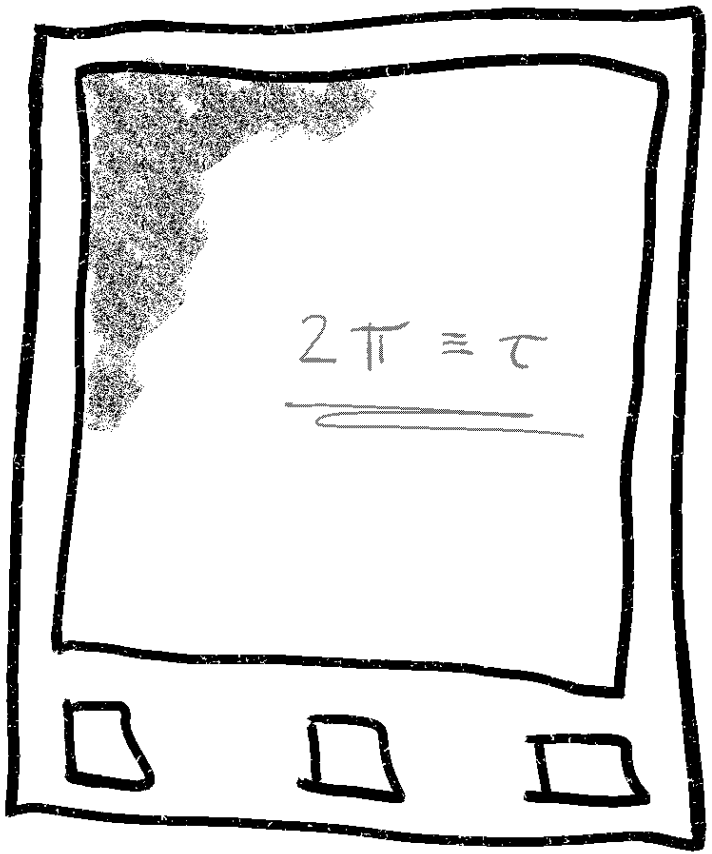
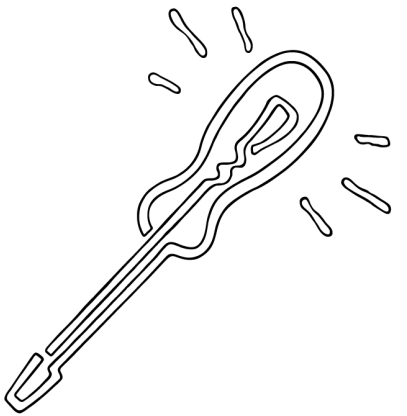


The .lines Binary Format

Decoding, documenting and converting the internal file format of the *reMarkable e-ink tablet*

e-ink Tablet





technical specs

- ARMv7 (Freescale i.MX6 SoloLite)
- low-latency, high-res. Wacom display
- Linux 4.1.28 with root access
- Apps: Qt 5.9 + SDK

Disclaimer(s)

This is a hobby project.

The author(s) and contributor(s) are not associated with reMarkable AS, Norway.

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Proprietary Binary Format

- internal format for notebooks: .lines
- vector export (PDF) bloated & broken
- import/export (Linux & Android) broken, beta-webapp, "cloud“…

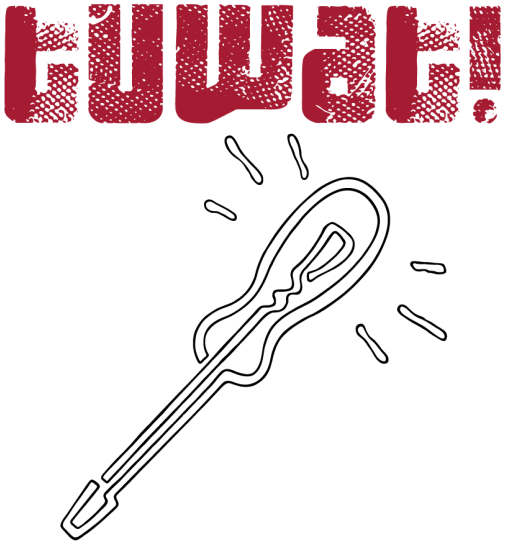
Proprietary Binary Format

- internal format for notebooks: .lines
- vector export (PDF) bloated & broken
- import/export (Linux & Android) broken, beta-webapp, "cloud“…

- OCR, animations, more brushes, imports in inkscape, live/input to other devices
- informational self-determination

Decode it!

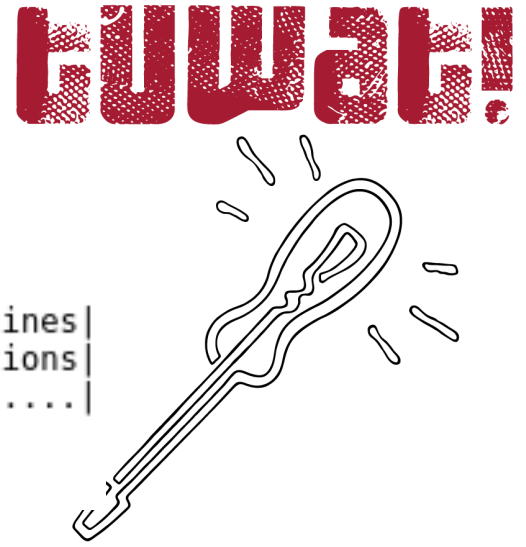
from simple to complex



Decode it!

from simple to complex

```
00000000··72·65·4d·61·72·6b·61·62··6c·65·20·6c·69·6e·65·73··|reMarkable·lines|
00000010··20·77·69·74·68·20·73·65··6c·65·63·74·69·6f·6e·73··|·with·selections|
00000020··20·61·6e·64·20·6c·61·79··65·72·73·01·00·00·00·01··|·and·layers.....|
00000030··00·00·00·00·00·00·00·00·····························|.......|
00000037
```



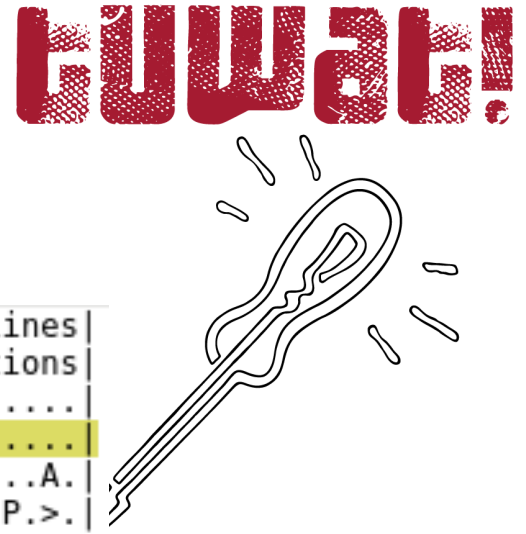
Decode it!

from simple to complex

```
00000000  72 65 4d 61 72 6b 61 62  6c 65 20 6c 69 6e 65 73  |reMarkable lines|
00000010  20 77 69 74 68 20 73 65  6c 65 63 74 69 6f 6e 73  | with selections|
00000020  20 61 6e 64 20 6c 61 79  65 72 73 01 00 00 00 01  | and layers.....|
00000030  00 00 00 01 00 00 00 04  00 00 00 00 00 00 00 00  |................|
00000040  00 00 00 00 00 f0 3f 03  00 00 00 00 00 e8 41 00  |......?.......A.|
00000050  e0 e3 44 81 09 98 3c c1  50 9f bd c1 50 9f 3e 00  |..D...<.P...P.>.|
00000060  00 e8 41 00 e0 e3 44 81  09 98 3c c1 50 9f bd c1  |..A...D...<.P...|
00000070  50 9f 3e f4 7c e8 41 11  de e3 44 db d6 a0 3b c1  |P.>.|.A...D...;.|
00000080  50 9f bd c1 50 9f 3e                              |P...P.>|
00000087
```

Decode it!

from simple to complex



```
00000000  72 65 4d 61 72 6b 61 62  6c 65 20 6c 69 6e 65 73  |reMarkable lines|
00000010  20 77 69 74 68 20 73 65  6c 65 63 74 69 6f 6e 73  | with selections|
00000020  20 61 6e 64 20 6c 61 79  65 72 73 01 00 00 00 01  | and layers.....|
00000030  00 00 00 02 00 00 00 04  00 00 00 00 00 00 00 00  |................|
00000040  00 00 00 00 00 f0 3f 03  00 00 00 00 00 e8 41 00  |......?.......A.|
00000050  e0 e3 44 81 09 98 3c c1  50 9f bd c1 50 9f 3e 00  |..D...<.P...P.>.|
00000060  00 e8 41 00 e0 e3 44 81  09 98 3c c1 50 9f bd c1  |..A...D...<.P...|
00000070  50 9f 3e f4 7c e8 41 11  de e3 44 db d6 a0 3b c1  |P.>.|.A...D...;.|
00000080  50 9f bd c1 50 9f 3e 04  00 00 00 00 00 00 00 00  |P...P.>.........|
00000090  00 00 00 00 00 f0 3f 04  00 00 00 00 00 a0 41 00  |......?.......A.|
000000a0  20 da 44 41 08 04 3d d9  3a 33 be c1 50 1f 3f 00  | .DA..=.:3..P.?.|
000000b0  00 a0 41 00 20 da 44 41  08 04 3d d9 3a 33 be c1  |..A. .DA..=.:3..|
000000c0  50 1f 3f bf 5d 9e 41 40  27 da 44 c1 09 9c 3b d9  |P.?.].A@'.D...;.|
000000d0  3a 33 be c1 50 1f 3f 2c  25 9e 41 5d 28 da 44 bb  |:3..P.?,%.A](.D.|
000000e0  db ee 3b d9 3a 33 be c1  50 1f 3f                 |..;.:3..P.?|
000000eb
```

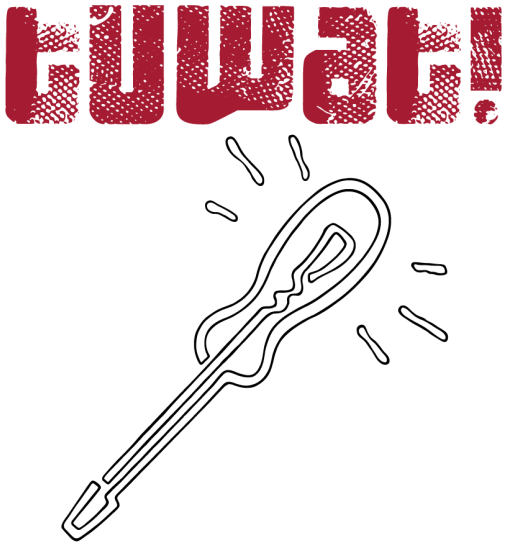
Systematically Guess

a matrix for de-serialization

Systematically Guess

a matrix for de-serialization

char int8 int32 int64 float16 float32 ...



Systematically Guess

a matrix for de-serialization

char int8 int32 int64 float16 float32 ...

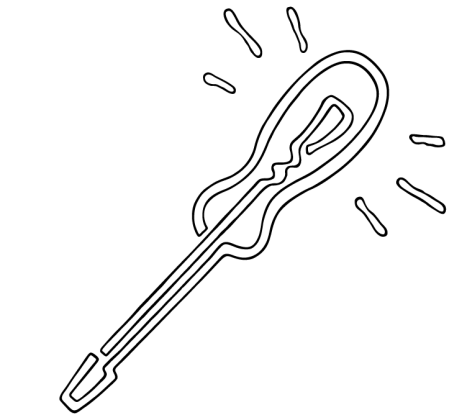
+0

+1

+2

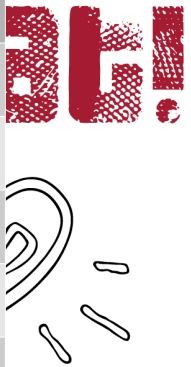
+3

Byte offset for next value



Sy
a m

int8_t	int16_t	int32_t	float
4	4	4	5.60e-45
0	0	16777216	2.35e-38
0	0	65536	9.18e-41
0	256	256	3.58e-43
1	1	1	1.40-45
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	-268435456	-1.58e+29
0	0	1072693248	1,87E+03
0	-4096	71299072	2.25e-36
-16	16368	278512	3.90e-40



int8_t	int16_t	int32_t	float
4	4	4	5.60e-45
0	0	16777216	2.35e-38
0	0	65536	9.18e-41
0	256	256	3.58e-43
1	1	1	1.40-45
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	-268435456	-1.58e+29
0	0	1072693248	1,87E+03
0	-4096	71299072	2.25e-36
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1	1	1	1.40-45
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	-268435456	-1.58e+29
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0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	-268435456	-1.58e+29
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0	0	16777216	2.35e-38
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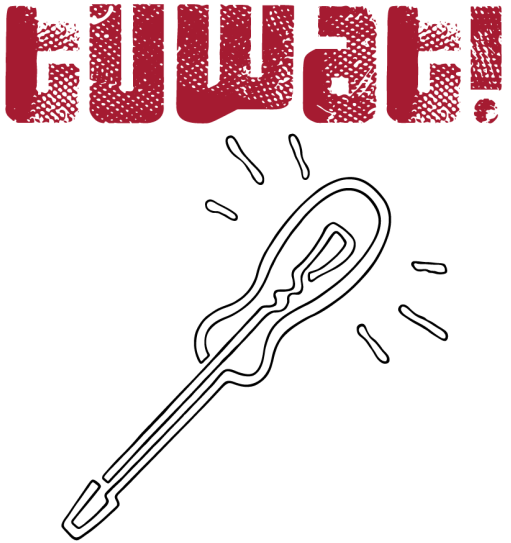
1	1	1	1.40-45
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	0	0,0E+00
0	0	-268435456	-1.58e+29
0	0	1072693248	1,87E+03
0	-4096	71299072	2.25e-36
-16	16368	278512	3.90e-40

Result

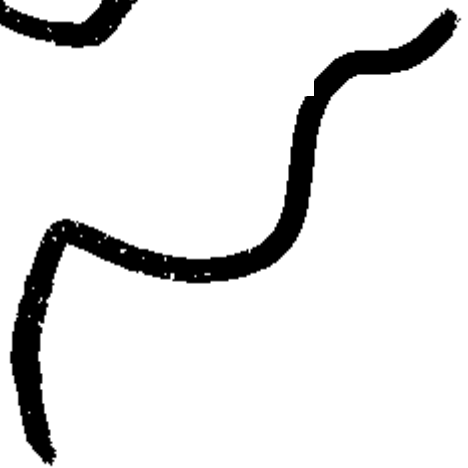
int32_t
int32_t
int32_t
int32_t
int32_t
int32_t
float
int32_t
5x float
5x float
5x float



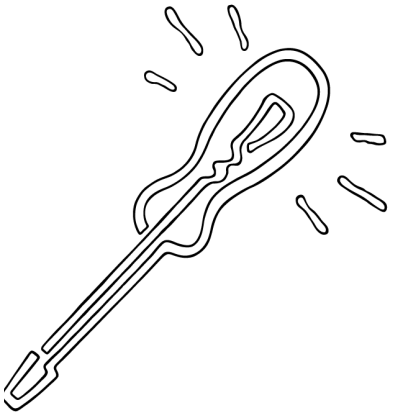
Result

int32_t
int32_t
int32_t
int32_t
int32_t
int32_t
float
int32_t
5x float
5x float
5x float

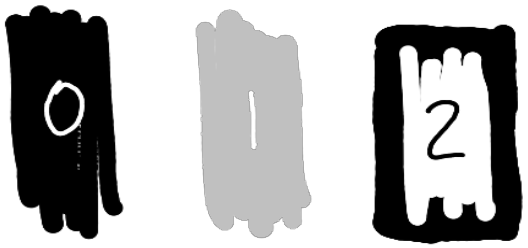
Result

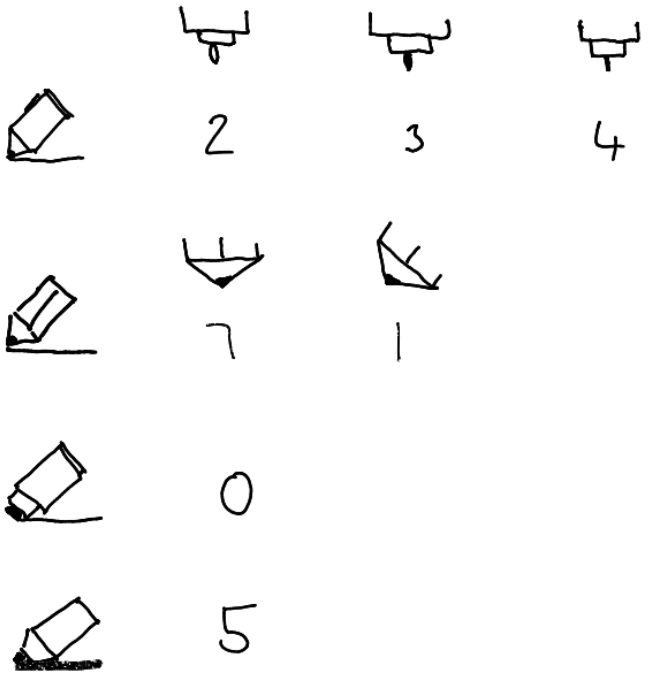


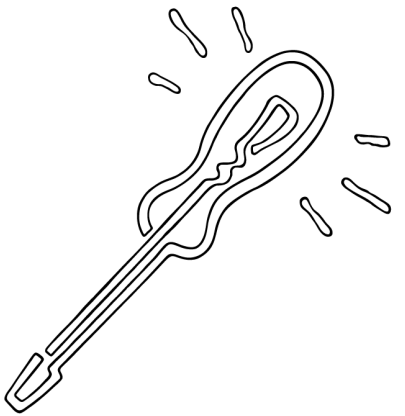
no. of pages
no. of layers
no. of lines
brush type
color
zero (selected?)
brush base size
no. of points
coord, pressure, 2x rotation
coord, pressure, 2x rotation
coord, pressure, 2x rotation

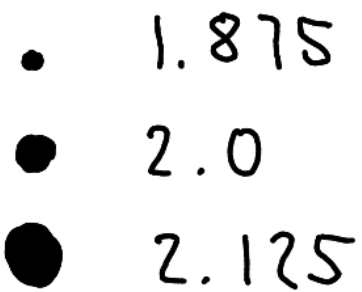


Enums / Magic Numbers

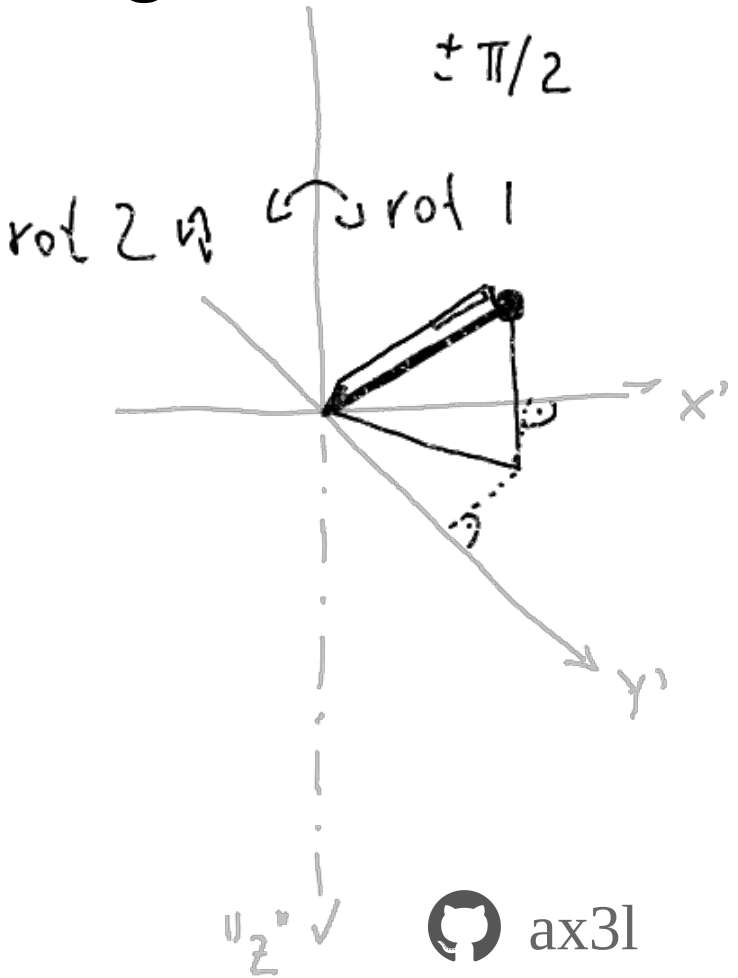






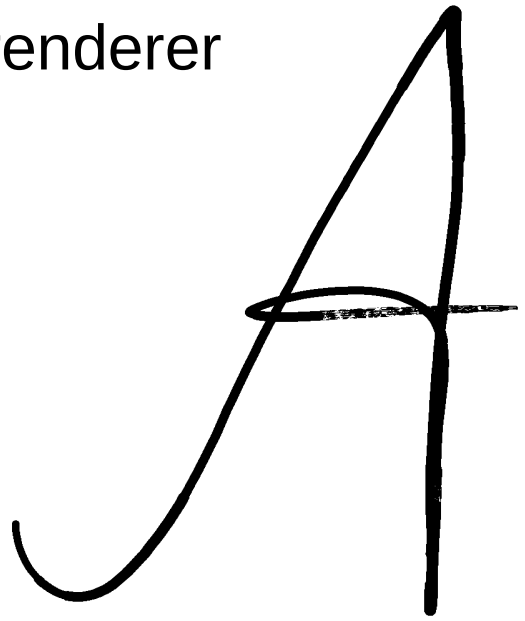


Enums / Magic Numbers



New Possibilities!

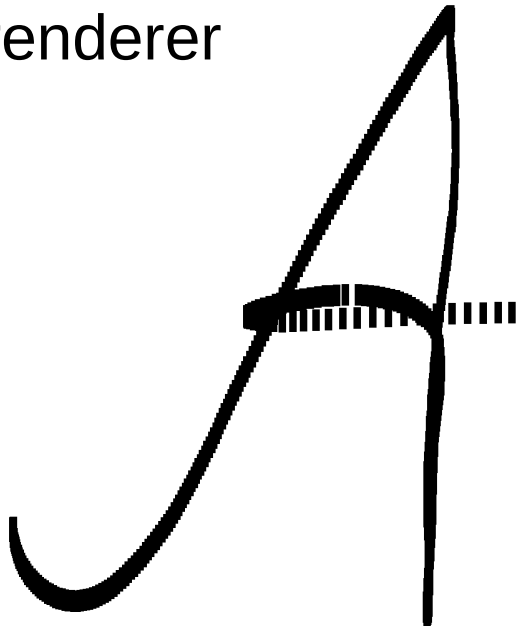
e.g. roll your own renderer



ORIGINAL

New Possibilities!

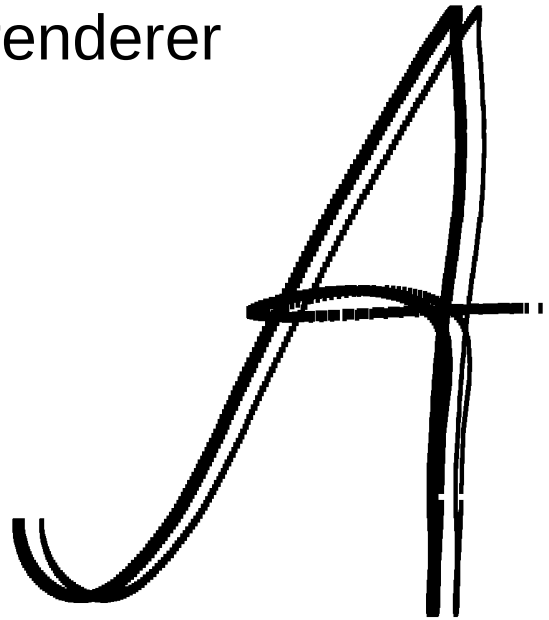
e.g. roll your own renderer



render 1

New Possibilities!

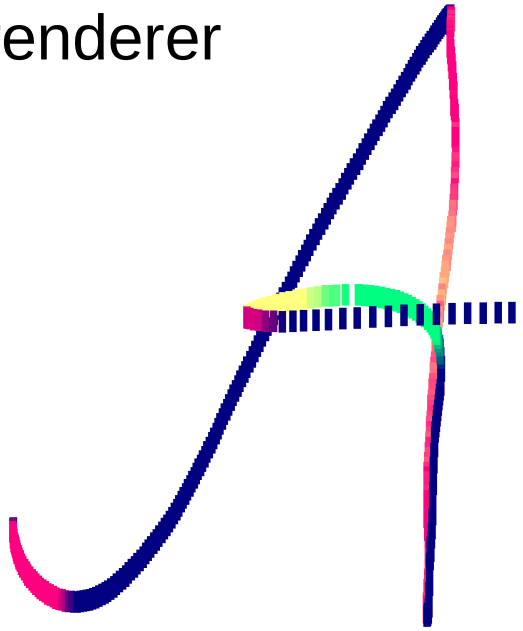
e.g. roll your own renderer



render 2

New Possibilities!

e.g. roll your own renderer



render 3

What the FOSS?

documentation, file API, render example

ax3l / lines-are-beautiful [C++]

https://plasma.ninja/blog [docs]