GUST e-foundry font projects, closing report 2019–2020

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1 For the record

The GUST e-foundry's set of interrelated projects that are reported on here was conceived in 2015. A leaflet presenting the ideas and asking for financial support was sent out to various TeX LUG boards later that year. Support was offered in 2015 by NTG, in 2016 by $\mathcal{C}_{\mathcal{S}}$TUG and ConTeXt Group. DANTE e.V. and TUG joined in 2017.

The "advertising" leaflet mentioned above was turned into a one page summary and published in *TUGboat*, Volume 38 (2017), No. 2 as "GUST e-foundry current font projects" (`tug.org/TUGboat/tb38-2/tb119ludwichowski.pdf`).

The official start of the project was never declared, but it seems that 2017 is a good number. However, work was being done already in 2016.

2 What was planned

The main goal of those projects was to add mathematical, technical and geometrical symbols to all of the TeX Gyre text fonts with the exception of TG Chorus. TG Chorus was excluded as such symbols seem of little use in a chancery font.

Further, several related ideas were coined:

- a sans-serif math OTF font, possibly based on DejaVu, for use in headings;
- a heavy math OTF font, possibly based on TG Termes, also for headings;
- a monospace text font with math symbols, for use in text editors.

Two other goals were also set:

- enhancements to existing math fonts, like math kerns, variant extra alphabets (e.g., calligraphic or double-struck) implemented using the "stylistic set" features `ss01`–`ss20`;
- continuous, yearly maintenance reviews and, if needed, releases of e-foundry's fonts with fixes.

3 Stage 1: What was done through 2018

The outcome of the part of the project that might be called its first stage was described in the paper by B. Jackowski, P. Pianowski, and P. Strzelczyk "TeX Gyre text fonts revisited", published both in *TUGboat*, Volume 39 (2018), No. 3 (`tug.org/TUGboat/tb39-3/tb123jackowski-gyre.pdf`) and *Die TeXnische Komödie*, 30. Jahrgang, Heft 3/2018.

This is a crude summary of what was done (for details see the article):

- devising the enhanced repertoire of glyphs;
- elements of MetaType1 (`en.wikipedia.org/wiki/METATYPE1`) were reimplemented by replacing `t1utils` and some AWK and Perl scripts with Python code interfacing to FontForge — both more portable and easier to maintain;
- the internal structure of the TG fonts became even more OTF-like:
  - the `ss10` feature allows the use of the original math symbols if replacements are not liked or needed; and
  - the "anchors" mechanism based on the `ccmp`, `mark` and `mkmk` features is used to place accents over glyphs in a precise way;
- the improved MetaType1 was used to extend the list of glyphs of TG Adventor and TG Pagella by over 850 items, which took the fonts to version 2.501.

4 Stage 2: Algotype, the successor to MetaType1, 2019–2020

After releasing the new versions of TG Adventor and Pagella, the team decided to attempt a full reimplementation of MetaType1.

It is important to notice that up to now, for over 20 years, all of the many e-foundry's fonts were produced with MetaType1. This program began in late nineties of the twentieth century as a no-name engine to create Adobe PostScript Type 1 outline fonts for Janusz M. Nowacki's efforts to revive the traditional Polish type Antykwa Półtawskiego and was reported at the Heidelberg EuroTeX Conference in 1999 ("Antykwa Półtawskiego: a parameterized outline font", `https://jmn.pl/biblio/02ap.pdf`).

A few years later OpenType became an ISO standard (ISO Standard ISO/IEC 14496-22, Part 22: Open Font Format, March 2007; updated 2019). Naturally, the program by the name MetaType1 has been adapted and OpenType versions could be included in the TeX Gyre collection of fonts (released in 2006–2007).

Another adaptation of MetaType1 became necessary with the advent of OpenType Math fonts when in 2010 Microsoft implemented math font support into MS Office. MetaType1 proved itself by generating the TG Math fonts: Bonum, Pagella, Schola, Termes and later DejaVu. The engine was also used by the e-foundry team for Latin Modern fonts in both Type 1 and OpenType formats, along with the LM OpenType math font.

All of these changes, accumulated over so many years, have lead inevitably to MetaType1 becoming rather unwieldy and complex. In particular, porting of the system became a nightmare, which was

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experienced when Marek Ryćko had to step in for Piotr Strzelczyk who left the team in early 2019 and MetaType1 had to be installed from scratch in a different environment.

This departure of Piotr Strzelczyk was a severe blow and forced a drastic change in priorities: nothing became more important than a reimplementation and redesign of the font production line. At BachoTEX 2019, the article "Redesign of a MetaPost-based font generating system" by Marek Ryćko and Bogusław Jackowski, presented by Marek Ryćko was awarded the W.J. Martin Prize.

MetaType1 was rewritten in such a way that only MetaPost and Python 3 (with some pieces of Python 2 to communicate with the FontForge library) are used. Moreover, a new way of configuring the system was worked out — the configuration is now governed by simple, universal data files (in JSON format). Exactly the same scripts can be run both under GNU/Linux and Windows (no tests with Macintosh were performed so far), which has solved the portability problem.

The new engine is called Algotype. The name tries to stress that fonts are being defined algorithmically. The Python part of Algotype is now available at `pypi.org`.

The team will publish the Algotype system on GitHub.

5 Current and future font works, 2021–

Immediate future:[1]

- Algotype is being used for production work already, but still requires further effort.

- Enhanced (see the "What was planned" section) TG text fonts Schola and Termes, processed with Algotype, are close to being released together with revised versions 2.501 of TG Adventor and TG Pagella.

- A new release of the Latin Modern fonts with corrections proposed by Frank Mittelbach at BachoTEX 2019.

- 2021 should see the rest of the enhancements to the TEX Gyre family, i.e., the new releases of TG Bonum, TG Cursor and TG Heros.

The renewed team with Marek Ryćko hopes to be able to tackle in the near future the remaining tasks listed in section "What was planned", although we cannot make promises.

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[1] It should be noted that the first three items would have already happened if it were not for the COVID-19 pandemic and Bogusław Jackowski being hospitalized for over a month for a COVID-19 infection and then heart surgery.

6 Financing (support) up to date

The following donations to the project were received and paid out up-to-date:

- ConTEXt Group: 1,500 EUR in the years 2017–2019;
- $\mathcal{C}_{\mathcal{S}}$TUG: 2,000 EUR in the years 2017–2018;
- DANTE e.V.: 7,000 EUR in 2018;
- NTG: 18,000 EUR in the years 2015–2020;
- TUG: 2,903 USD in 2017;
- individual persons: 1,960 PLN in the years 2017–2019.

The total funding has amounted to 28,500 EUR, 2,903 USD and 1,960 PLN. Donations are always welcome at `tug.org/donate`, as well as through the other user groups.

The GUST e-foundry is deeply grateful to all its supporters and promises to continue its best efforts.

7 Unrelated: Other GUST packages updated

Bonus information not related to the e-foundry, although many of the same people are involved: several packages originating with GUST were updated for the TEX Live 2021 release, for the first time in many years: `cc-pl`, `mex`, `pl-mf`, `plhyphen` and `lm`.

The updates clarify the licensing (mostly public domain), update the source encoding to UTF-8, and other housekeeping matters. There are no notable changes in functionality, except for `lm`: a bug, known since 2015, was fixed in the Latin Modern LATEX support.

8 Final remark: Feedback requested

The gentle readers of this report are kindly asked for feedback: do you like/hate/see faults in/ask for enhancements to/propose fixes to/... the works of the GUST e-foundry, or other packages?

Please write! We will do our best to satisfy your request.

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