Summary of math font-related activities at EuroTEX '98

1 Introduction

The subject of math symbol fonts has been one of the major topics of interest at the 10th European TEX Conference (EuroTEX '98), which was held on March 29–31, 1998 at St. Malo, France as part of the 2nd Week on Electronic Publishing and Digital Typography (WEPT '98).

During the conference a paper summarizing the activities of the Math Font Group[1] (MFG) [1] was presented and two BOF sessions on math fonts were held, bringing together members of the MFG and representatives of other interested parties, such as the W3C MathML working group, the STIX project, as well as publishers and typesetters.

In addition, there were also many private discussions on math fonts at lunches, dinners, and at informal get-togethers in the local cafés or pubs.

The discussions at the BOF sessions primarily revolved around two major topics:

- the organization of math symbols in general, including their representation on the WWW,
- the development and implementation of new 8-bit math fonts for (LA)TEX in particular.

2 Organization of math symbols

On the first topic, Barbara Beeton and Patrick Ion of the AMS provided some information about the so-called STIX project, which is driven by a group of scientific and technical publishers (STIPUB).

So far, the primary goal of the STIX project has been to compile a comprehensive list of *all* math symbols used by the participating publishers (also including what many people might call "unreasonable" ones), to document their intended meanings, and to provide examples of their use in support of an application to the Unicode Consortium and the ISO working group on coding standards.

A preliminary list of symbols has already been submitted to Unicode in March 1998, but it appears that there are quite a few symbols that have been missed, so the Unicode submission will have to be followed up when more material is available.

Apart from compiling a comprehensive list of math symbols, there is also a commitment to commission the production of a set of high-quality fonts implementing all the symbols, which should be freely distributable. It is hoped that the availability of such a font set will be a crucial step to help promote the use of MathML on the World Wide Web without being restricted to the symbol complement provided by the system fonts.

Information about the list of symbols collected by the STIX project currently resides on internal pages on the AMS Web server [2] and is kept in a format similar to the Unicode symbol tables [3], but there are plans to release a printable version of these tables in PDF format to the general public soon.

It was pointed out that a printable version of the symbol tables from the MathML specification is supposed to be available in PDF format on the W3C Web server [4].[2] The latest version of the MathML specification also includes some background information about the STIX project and references to various other glyph collections [5, Chapter 6].

3 Implementation of new 8-bit math fonts for (LA)TEX

On the second topic, the status of the activities of the Math Font Group was reported in a conference paper [6] presented by Ulrik Vieth in the morning session on the first day of the conference.

So far, a set of encodings for new 8-bit math fonts for (LA)TEX has been developed based on a proposal dating back to TUG '93 [7], which aims to fulfill certain design goals and to satisfy a number of technical constraints.

These encodings, which consist of three primary encodings and several additional ones, have been implemented as a set of virtual font using glyphs taken from existing or newly-developed METAFONT or PostScript fonts. Several such sets of virtual fonts have been developed, covering most of the presently available sets of math fonts usable with TEX, but the implementation unfortunately remains incomplete in several cases. It also doesn't yet take into account many of the symbols identified by the STIX project, which may have to be added to the proposed encodings if they are really needed.

A LATEX interface to access the new encodings and to switch between different font sets implementing these encodings is already in place and may be used either as a module to build a modified LATEX kernel or as an add-on package for use with standard LATEX. However, a Plain TEX interface is still missing and remains to be developed.

Given all these preparations, the question remains whether the encodings developed by the MFG

[1] also known as: LATEX3 Project / TUG Technical Working Group on extended math font encodings (WG 92-01)

[2] Unfortunately, these symbol tables seem to have disappeared about a week after the conference when the MathML 'Proposed Recommendation' was updated and promoted to an 'Official Recommendation'. Hopefully, they will be put back after they have been updated as well.

are acceptable to the user community and whether they satisfy the needs of scientific and technical publishers. While there wasn't a clear answer to this question, there seemed to be a consensus that new 8-bit math fonts addressing the organizational problems of the old 7-bit math fonts were indeed needed and that the work of the MFG provides a suitable starting point, which may have to be refined later during the implementation process.

In particular, there was a suggestion to relax the strict requirement for compatibility with Plain TEX or LATEX within the first four math families, and to adopt a slightly more rational organization which would allow to have fewer missing glyphs in some implementations of the primary symbol font by leaving out some problematic glyphs and relocating them to one of the extra symbol fonts.

Another request came from A. Berdnikov, the coordinator of the 8-bit Cyrillic encodings for TEX, who pointed out that Russian math typesetting traditions required different shapes of big operators, such as upright integrals and bigger versions of summation and product signs, and asked to support such variants in the new math font encodings as well.

Since it is clear that it will be necessary to add several additional symbol font encodings if all the STIX glyphs are to be incorporated eventually, minor adjustments to the present proposal may be needed anyway and should not present a problem. In any case, the encoding tables presented at the conference should not be taken as the final word.

A strong driving force to push forward the implementation of new 8-bit math fonts for (LA)TEX came from Taco Hoekwater of Kluwer Academic Publishers. As part of his professional activities, he is currently working on a project to implement as many mathematical symbols as possible in Type 1 format by the end of this year, possibly including everything in the list of STIX glyphs.

Since Kluwer Academic Publishers consider their products to be journals and books, not fonts, Taco is allowed to put all the fonts he produces for Kluwer into the public domain. He has already converted several existing METAFONT symbol fonts (including `rsfs`, `stmary` and `wasy`) to Type 1 format using the MetaFog converter [8], and released the results to CTAN shortly before the conference.

Concerning the production of new 8-bit math fonts, he suggested concentrating on the Computer Modern version which appears to be the easiest one to start with. In particular, he proposed to start by de-virtualizing the present implementation, which happens to draw characters from a number of base fonts, so as to have a real METAFONT font that could be converted more easily with MetaFog.

New symbols from the STIX collection could then be added by new METAFONT designs, which shouldn't be too difficult to develop in most cases, as many symbols can be realized by combinations or variations of existing symbols.

On the other hand, there seems to be little that can be done about the versions based on commercial font sets such as MathTime or Lucida New Math, which will probably remain restricted to whatever symbol complement is provided in the present versions of the base fonts, unless the suppliers of these font sets will invest some work themselves.

Another suggestion also discussed was to have a set of 8-bit fonts serving as glyph containers organized by types of symbols, which could either be used as the basis for a virtual font implementation of 8-bit math fonts, meeting the technical constraints of TEX, or combined into a single huge 16-bit math font for Omega. While this might be an interesting option for the future, it was pointed out by several participants that neither Omega nor virtual fonts could be assumed to be available everywhere and that a straightforward METAFONT implementation of new 8-bit fonts for TEX was still needed.

Finally, it was discussed what to do about the Plain TEX support of the new math fonts. Since Kluwer Academic Publishers are using Hans Hagen's ConTEXt package, which happens to be based on Plain TEX, Taco will take care of this task as well, since he will need it for his own work.

A suggestion to use the existing LATEX support on top of a Plain TEX emulation of the NFSS interface was rejected, since the LATEX-like syntax doesn't easily fit into the framework of the ConTEXt system, so a low-level Plain TEX interface is preferred.

4 Summary and Conclusions

In summary, one might say that the EuroTEX '98 conference was a great success for math font-related activities in that it helped to bring together members of several working groups and other interested parties, who so far have been working on closely related topics independently of each other.

In particular, the STIX project provided a lot of input to the 8-bit math font encodings for TEX, while on the other hand there was also some feedback to the STIX project in the form of additional symbols that have been missed so far.

While the STIX project will continue to work on getting their list of symbols assigned to Unicode, primarily in support of MathML and SGML-based

authoring systems, the Math Font Group will continue to work on completing the implementation of new 8-bit math fonts for (LA)TEX, hopefully by the end of this year.

Current plans include starting with the development of the Plain TEX interface and a de-virtualized METAFONT implementation of the Computer Modern version as soon as possible and to begin adding more symbols once this is in place.

It is hoped that we will be able to provide at least one very comprehensive implementation of new 8-bit math fonts (including the STIX glyphs) in Computer Modern style in both METAFONT and Type 1 formats. In addition, we weill provide several partial implementations for other font families such as MathTime and Lucida New Math, which will be implemented as virtual fonts based on the symbol complement provided by these font sets.

References

[1] Home Page of the Math Font Group (MFG). `http://www.tug.org/twg/mfg/`. Includes complete archives of test releases, discussion papers and mailing list traffic.

[2] STIPUB Working Group. STIX symbol tables. `http://www.ams.org/STIX/`.

[3] Unicode Consortium. Unicode 2.0 symbol tables. `http://www.unicode.org/Unicode.charts/`.

[4] W3C Math Working Group. MathML specification and symbol tables. `http://www.w3.org/Math/mathmlchars.pdf`.

[5] W3C Math Working Group. Mathematical Markup Language, Official Recommendation. `http://www.w3.org/TR/REC-MathML/`.

[6] Matthias Clasen and Ulrik Vieth. Towards a new math font encoding for (LA)TEX. *Cahiers GUTenberg*, 28–29:94–121, 1998. Proceedings of the 10th European TEX Conference.

[7] Alan Jeffrey. Math font encodings: A workshop summary. *TUGboat*, 14(3):293–295, 1993.

[8] Richard J. Kinch. MetaFog: Converting METAFONT shapes to contours. *TUGboat*, 16(3):233–243, 1995.

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