

Martin Schröder

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T_EX@2012

$T_E X$ in the 21^{st} Century – where are we and what is up

Martin Schröder

Linuxtag 2012 23rd-26th May 2012, Berlin, Germany





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Three types of booth visitors

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Motivation

Three types of booth visitors

- 1. Does not know TEX
- Has used TEX some years or decades ago to typeset a larger document and is astonished that it still exists and wants to know what is new This talk is for you
- 3. Currently typesets a larger document with TEX and needs help

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1978 T_FX78

1982 TFX82

1986 LATEX 1990 T_FX90 1994 METAPOST 1994 LATEX 2°

1996 T_FXlive 1996 ConT_EXt 1997 pdfT_FX 2004 X¬TFX 2007 LuaTFX

2007 ConTFXt MKiV

1994–2006 teTFX

1982 METAFONT

1986 Computers & Typesetting (TEXbook etc.)

Problems

Problems we are working on: Unicode input

1982 T_EX82: 7 bit

1990 T_EX90: 8 bit

1991 Unicode

1991-2004 Omega: 16 bit

2004 X∃T_EX: 32 bit

2007 LuaTFX: 32 bit

2010–today Unicode math (works with X \exists TeX and LuaTeX,

but we need more free fonts)

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Problems we are working on: Fonts

TeX does not handle fonts itself but reads only metric information (tfm files) and leaves the usage of font files to the output drivers. Originally these worked only with METAFONT fonts but nearly nobody outside of the TeX world created them.

The rest of the world instead developed PostScript (1984), TrueType (1991) and lately OpenType (1996). These fonts can be used with troubles (by experts) with T_EX and $pdfT_EX$, but then the special features of OpenType are ignored. Today we have X_TEX and LuaTEX which make the usage of OpenType fonts very simple.

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Problems we are working on: PDF

TEX as designed by Knuth writes a device independent output format (DVI). Today the standard is PDF (1993). For that we made output drivers and finally pdfTEX (1997), which can write PDF directly.

pdfTEX is now the default engine of the TEX world. X3TEX and LuaTEX can also write PDF.

The problem now is tagged PDF – that works with LuaTEX and ConTEXt since 2010, but not yet with LATEX.

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The problem now is tagged PDF – that works with LuaTeX and ConTeXt since 2010, but not yet with \LaTeX .

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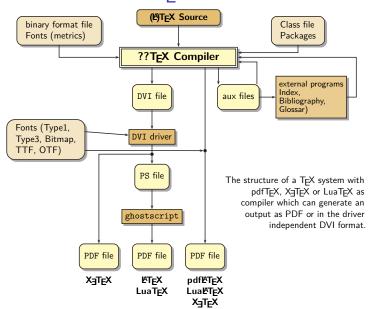
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A short overwiew: LATEX workflow



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The engines

 T_{EX} the original by Donald Knuth

 $\varepsilon\text{-TEX}$ small evolutionary extensions

pdfT_EX can create PDF and offers microtypographical extensions

XaTeX handles Unicode input and OpenType fonts; uses operating system specific libraries for font handling

LuaTEX can create PDF and offers microtypographical extensions, handles Unicode input and OpenType fonts; integrates Lua as a programming language, but is still compatible to TEX; integrates METAPOST.

Currently in beta; stable 1.0 planned for 2012.

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Much has changed since LATEX 2.09 (1989):

- ▶ $\mbox{\em Laplace} \mathbf{ETEX} \, \mathbf{2}_{\mathcal{E}}$: Planned as an intermediate version (ϵ) between $\mbox{\em Laplace} \mathbf{ETEX} \, \mathbf{2.09}$ and $\mbox{\em Laplace} \mathbf{ETEX} \, \mathbf{3}$; very stable since 1994
- ▶ KOMA script: An alternative to the standard classes adapted to the typographical conventions of Europe which offers many extensions
- hyperref: Adds support for hyperlinks, forms and other capabilities of PDF (e.g. metadata)
- ► LATEX3: Develops slowly but now offers a good foundation for developers of classes and packages which is used by many new packages (e.g. for X∃LATEX and LualATEX)

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Summary

To use the extensions of X_∃T_EX and LuaT_EX with Lagrange packages have been developed which can be used with the commands xelatex and lualatex:

- ▶ fontspec: Font handling
- ▶ polyglossia: Multilingual documents; an alternative to babel; currently works only with X∃LATEX
- ▶ luatextra: Loads all packages needed for LuaLATEX

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Summary

Presentations are one of the most popular uses of TeX. Let $\mathbb{E}X = \mathbb{E}X = \mathbb$

- beamer: Used for this talk, offers an excellent support of PDF
- ▶ powerdot: Uses PSTricks and therefore needs dvips or X¬TFX

ConTEXt is an alternative to LATEX that now (with version Mk IV) makes extensive use of LuaTEX and PDF to offer features that are hard or impossible with LATEX, e.g.:

- Multicolumn typsetting
- ► Integrated use of METAPOST (also possible with LualAT_EX)
- ► Handling of XML
- Support of layers
- ▶ Typesetting on a grid
- ▶ Creation of tagged PDF, XML, ePUB

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- ▶ METAPOST: An extension of METAFONT which can create PostScript and SVG. It can be used for diagrams and is integrated into LuaTFX
- ▶ PGF/TikZ: A macro package for LATEX and ConTEXt for creating very nice diagrams very easily
- ▶ PSTricks: A macro package for LATEX which uses PostScript for the creation of diagrams and graphics
- Asymptote: Creates vector graphics like METAPOST, but the programming is more like C++

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Bibliographies

One of the strengths of LATEX is the handling of bibliographies with BibTFX

- ▶ BibTFX: Can only handle 7 Bit and is difficult to program
- ▶ BibTFX8: Can only handle 8 Bit and is difficult to program
- Biber: A replacement of BibTFX used by BibPTFX; XML support is planned. The style files are programmed in T_FX
- ▶ BibATFX is the future (for ATFX)

Problems

Indexes

Good scientific books have indexes, so their creation also had to be automated

- MakeIndex: The standard solution since 1986: handles only 7 bit
- ▶ Xindy: Handles any language and unicode, sorting can be adapted, can handle arbitrary "page numbers" (e.g. "Genesis 1:31"), the markup can be configured
- Every generated index can be manipulated as needed by external programs

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It is not enough to have programs that can handle OpenType fonts, we also need good free OpenType fonts:

- ▶ Latin Modern: An extended and improved version of Computer Modern, which supports all "roman" languages
- ► T_EX Gyre: Extended and improved versions of the GhostScript PostScript default fonts
- Many polish fonts (Antykwa Toruńska, Kurier and Iwona, Cyklop)

Fonts

TEX of course needs math fonts and for decades has been the reference implementation for math typesetting, so math fonts (very few) were designed for TEX. With the advent of OpenType Microsoft designed OpenType math and created a math font (Cambria Math) for use with Office. Work is ongoing and mostly finished to extend the TFX engines (X = T = X) to handle OpenType math and to create free OpenType math fonts:

- ▶ Latin Modern and TEX Gyre: Work is ongoing on OpenType math
- Asana math: Free math font designed to complement Palatino, Beta.
- ▶ STIX/XITS: Free math fonts designed to complement Times. STIX is designed to handle all mathematical symbols included in Unicode; XITS is the OpenType version.

T_FX distributions

Since the installation of TEX was a real problem in the olden days (in the last millenium...), free and operating system independent TEX distributions were developed of which these two are still active:

TEXlive For Unix, MacOS and Windows. Has its own package management and offers online updates. All moden Unix distributions get their TEX from TEXlive. With TLContrib there is an additional package repository

MikT_EX For Windows with a package management and online updates

Both would be impossible without CTAN (the Comprehensive T_EX Archive Network), a network of FTP serves which offer software related to T_FX

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Books

There are a lot of books on LATEX and new ones are still published, but some deserve special attention

LATEX Companion The LATEX3 projects sole income is from the sale of the LATEX Companion, the follow-up to the LATEX manual by Leslie Lamport

DANTE books Since there were some books on LATEX missing and publishers are not always interested (the german translation of Lamport's book is unavailable for some years) DANTE (the german TEX user group) has published some books on its own (e. g. on KOMA script and PSTricks)

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User groups There are a number of national (and one international: TUG) user groups, of which DANTE (for german speakers) is the largest with more then 2000 members

Own conferences DANTE organises two conferences every year and there are conferences by other user groups (of these the polish one is highly recommended), one european and one on ConTEXt

Conferences by others For some years we also participate in conferences by others (e.g. the Linuxtag, FrOSCon, or OpenRheinRuhr) with booths and presentations

Funding The developement of TEX et. al. is not funded by companies but mainly by the user groups (from their membership fees and contributions)

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Stackexchange



- tex.stackexchange.com aka TeX.SX
- ▶ Public online since November 2010
- ► Currently more than 10 000 registered users, ca. 19 000 questions and more than 28 000 answers
- Unique in features and interface
- ▶ Has become the first stop for online TFX support
- ➤ The complete content is released under the cc-wiki license, regular database dumps are freely available for download on clearbits.net
- More infos

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Summary

Although TEX is now nearly 34 years old, it is still actively developed. The main topics are Unicode input and the use of OpenType fonts. The programs developed today are XaTeX and LuaTeX; both can and *should* be used (but one needs an

 $\protect\operatorname{\DeltaTEX}$ is still the standard and is being adapted to the new programs; ConTeXt is a very interesting "newcomer" which developes very fast