What's new since TEX?

Based on
Frank Mittelbach
Guidelines for Future TEX Extensions — Revisited
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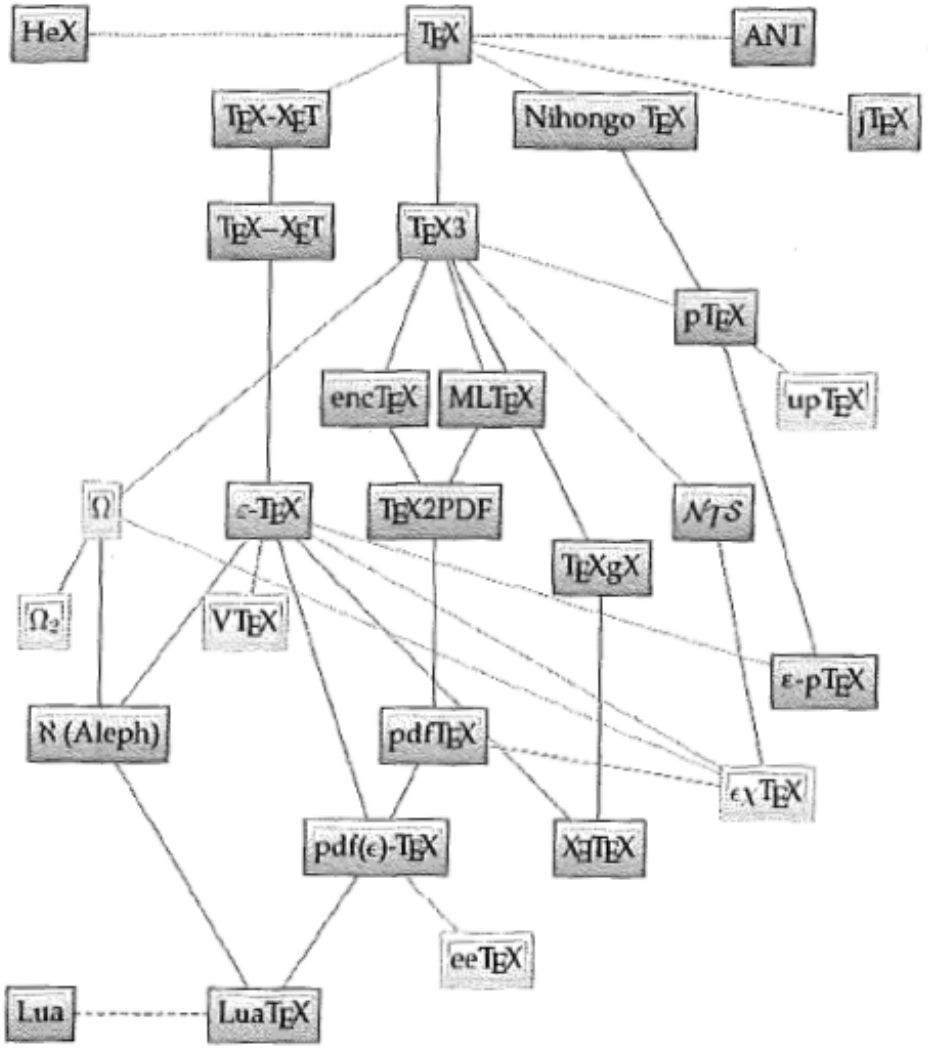
All versions of TEX



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- LuaTEX/LuaLATEX (2007): pdfTEX with embedded Lua scripting engine. Provides callbacks to hook into or replace underlying TEX typesetting engines.

Remaining problems

Researchers have identified various problems that require resolution; the rest of this talk covers some of them.

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- Rivers of white, identical word repeated in same place on successive lines.

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- Tracking: increasing/decreasing inter-letter spaces within a word. (in pdfTEX)
- Expansion: changing the width of glyphs. (in pdfTEX)
- Hanging punctuation: punctuation at the end of a line should protrude slightly. (in pdfTEX and luaTEX)

Microtypography

Features of package `microtype`

TEX engine			Micro-typographic features					
Engine	Version	Output	Protrusion	Expansion	(= auto)	Kerning	Spacing	Tracking
pdfTEX	< 0.14f	DVI/PDF	∅	∅	∅	∅	∅	∅
	≥ 0.14f	DVI/PDF	★	⊠	∅	∅	∅	∅
	≥ 1.20	DVI	★	⊠	∅	∅	∅	∅
		PDF	★	★	★	∅	∅	∅
	≥ 1.40	DVI	★	⊠	∅	⊠	⊠	∅
		PDF	★	★	★	⊠	⊠	⊠ [a]
LuaTEX	≥ 0.30	DVI	★	⊠	∅	∅	∅	∅
		PDF	★	★	★	∅	∅	∅
	≥ 0.62	DVI	★	⊠	∅	∅	∅	∅
		PDF	★	★	★	∅	∅	⊠
XETEX	≥ 0.9997	PDF	★	∅	∅	∅	∅	∅

★ = enabled ⊠ = not enabled ∅ = not available *a* ≥ 1.40.4 recommended

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- Consecutive penalties treated as *min*, so adding an explicit penalty to prevent a break doesn't work if there is an implicit small penalty (for instance, to discourage an orphan).

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- Ligatures and kerning tables should be language-specific, not just font-specific. Example: ffl may not be ligated in German. Workaround (pdfTEX): suppress all ligatures starting with a given character.

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- Sub-formulas are typeset (boxed) in natural width even if contained in a stretchable formula, and they cannot cross lines.
- No control over line-breaking in formulas. Solution: `breqn` package for LATEX.

TEX as a programming language

- TEX has limited programming constructs and it works by expansion (it's a "macro" language), making it very difficult to program. Solution: the `expl3` package provides a comfortable programming environment.
- It's impossible to access and manipulate internal data structures. Solution: LuaTEX.
- The "mouth" leads to the "stomach", not the reverse.
  - Mouth: token parsing and manipulation
  - Stomach: box generation and manipulation

  Once tokens are in boxes and glue, they cannot become tokens again. It would be better to have an intermediate data structure: character data plus attributes, like an abstract syntax tree in a compiler. Solution: LuaTEX.

Advice

- Use the LATEX enhancements on whatever underlying TEX engine you choose.
- Use pdfLATEX unless you need Unicode input.
- If you need Unicode input, use luaLATEX unless you need bidirectional output.
- If you need bidirectional output, use XƎLATEX with the `bidi` package.
- Use the `microtype` package. No parameters needed.