

# L<sup>A</sup>T<sub>E</sub>X News

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## Introduction

This document is under construction ...

## Primitive requirements

Since the finalisation of  $\varepsilon$ -T<sub>E</sub>X in 1999, a number of additional ‘utility’ primitives have been added to pdfT<sub>E</sub>X. Several of these are broadly useful and have been requirements for expl3 for some time, most notably `\pdfstrcmp`. Over time, a common set of these ‘post- $\varepsilon$ -T<sub>E</sub>X’ primitives have been incorporated into X<sub>Y</sub>T<sub>E</sub>X and (u)p-T<sub>E</sub>X; they were available in LuaT<sub>E</sub>X already.

A number of the additional primitives are needed to support new or improved functionality in L<sup>A</sup>T<sub>E</sub>X. This is seen for example in improved UTF-8 handling, which uses `\ifincsname`. The following primitive functionality (which in LuaT<sub>E</sub>X may be achieved using Lua code) will therefore be *required* by the L<sup>A</sup>T<sub>E</sub>X kernel after [INSERT DATE HERE]:

- `\expanded`
- `\ifincsname`
- `\ifpdfprimitive`
- `\pdfcreationdate`
- `\pdfelapseddtime`
- `\pdffiledump`
- `\pdffilemoddate`
- `\pdffilesize`
- `\pdflastxpos`

- `\pdflasttypos`
- `\pdfmdfivesum`
- `\pdfnormaldeviate`
- `\pdfpageheight`
- `\pdfpagewidth`
- `\pdfprimitive`
- `\pdfrandomseed`
- `\pdfresettimer`
- `\pdfsavepos`
- `\pdfsetrandomseed`
- `\pdfshellescape`
- `\pdfstrcmp`
- `\pdfuniformdeviate`

For ease of reference, these primitives will be referred to as the ‘pdfT<sub>E</sub>X utilities’.

Engines which are fully Unicode-capable must all provide the following primitives

- `\Uchar`
- `\Ucharcat`
- `\Umathcode`

In particular, note that `\Umathcode` is used as a marker primitive for this capability.

## Experiences with the L<sup>A</sup>T<sub>E</sub>X-dev formats

### *write*

In TeXLive 2020 the LuaL<sup>A</sup>T<sub>E</sub>X format will use the new LuaHB<sub>T</sub>E<sub>X</sub> engine, which is LuaT<sub>E</sub>X with an embedded HarfBuzz library. HarfBuzz can be used by setting a suitable renderer in the font declaration. An interface for that is provided by `fontspec`. This additional font renderer will greatly improve the shaping of various scripts, which are currently handled correctly only by X<sub>Y</sub>T<sub>E</sub>X. To simplify the testing of the new engine, binaries have been added to MiKTeX and TeXLive 2019 and both have changed the LuaL<sup>A</sup>T<sub>E</sub>X-dev format to use it.

### *Improved load-times for expl3*

The L<sup>A</sup>T<sub>E</sub>X3 programming layer, `expl3`, has over the past decade moved from being largely experimental to broadly stable. It is now used in a significant number of third-party packages, most notably `xparse` for defining interfaces in cases where no `expl3` code is “visible”. Most L<sup>A</sup>T<sub>E</sub>X documents compiled using X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X or Lua<sub>T</sub><sub>E</sub>X load `fontspec`, which is written using `expl3`.

The `expl3` layer contains a non-trivial number of macros, and when used with the X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X and Lua<sub>T</sub><sub>E</sub>X engines, it loads a large body of Unicode data. This means that even on a fast computer, there is a relatively large load time for using `expl3`.

For this release, the team have made adjustments in the L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> kernel to pre-load a significant portion of `expl3` as the format is built. This is transparent at the user level, other than the significant decrease in document processing time: there will be no “pause” for loading Unicode data files. Loading of `expl3` in documents and packages can be done as usual; eventually, it will be possible to omit

```
\RequirePackage{expl3}
```

entirely, but to support older formats, this is still recommended at present.

### *Other changes to the L<sup>A</sup>T<sub>E</sub>X kernel*

*fixed gh198*

### *Changes to packages in the tools category*

*fixed gh190*

### *Changes to packages in the amsmath category*

### *Documentation updates*

### *References*

- [1] Frank Mittelbach: *The L<sup>A</sup>T<sub>E</sub>X release workflow and the L<sup>A</sup>T<sub>E</sub>X dev formats*. In: TUGboat, 40#2, 2019.  
<https://latex-project.org/publications/>
- [2] L<sup>A</sup>T<sub>E</sub>X Project Team: *L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> font selection*.  
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- [3] *L<sup>A</sup>T<sub>E</sub>X documentation on the L<sup>A</sup>T<sub>E</sub>X Project Website*.  
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