

Special and common aspects of pdf/dvi/xdvi generators

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1 Introduction

This document is created with `lualatex` or that like with output format PDF. The package `tex4ht` is not loaded.

This document is about features the three generators on `latex`, `pdflatex`, `lualatex` and `xelatex` have in common and discusses also aspects under which they are specific. These programs are just underlying tex engines preloading the the L^AT_EX format. The names of the underlying engines just drop the inner syllable “`la`”. For `pdfltex` there is a user manual [THHB23], for `luatex` there is a reference manual [HHHS23] and for `xetex` a reference guide [RHB23].

The first aspect we cover are the options (among those to display the version). It turns out, that the options are specific for the distribution. Besides T_EX Live there is a second important distribution, MiKTeX, which should also be treated.

We treat the options for T_EX Live in Section 2 and for MiKTeX in Section 3.

2 The options for T_EX Live

Note that in fact we use a variant of `luatex`, called `luahbtex`.

This document is valid for versions of the underlying tex engine as given in Table 1. Moreover, our research refers to a specific distribution, T_EX Live.

converter	version
pdf \LaTeX	pdfTeX 3.141592653-2.6-1.40.24
x \LaTeX	XeTeX 3.141592653-2.6-0.999994
lua \LaTeX	LuaHBTeX, Version 1.15.0

Table 1: Converters and the version this document refers to

We start with a synopsis of the options. Table 2 shows options of the converters under consideration. Note that in contrast to the other converters, lua \LaTeX defines options starting with `--` but it can also process the options if given with a single dash also. Conversely, converters other than lua \LaTeX can also deal with options starting with single dash. Options unknown to a converter never result in an error or even a warning; instead just a info message is displayed. This allows to create a configuration which works for all converters.

In Table 2 column “included”, each converter is represented by the starting letter of its name, so for each option it is known which converters know about it and conversely, which options each converter has.

The table allows to furnish configurations working for all converters. Some options are common to all converters

option	included			explanation
<code>(-)-cnf-line=STRING</code>	p	x	l	parse STRING as a configuration file line
<code>--credits</code>	-	-	l	Display credits and exit.
<code>--debug-format</code>	-	-	l	enable format debugging
<code>(-)-draftmode</code>	p	-	l	switch on draft mode (generates no output PDF)
<code>-enc</code>	p	-	-	Enable encTeX extensions such as <code>\mubyte</code>
<code>-etex</code>	p	x	-	enable e-TeX extensions
<code>(-)-[no-]file-line-error</code>	p	x	l	disable/enable file:line:error style messages
<code>--[no-]file-line-error-style</code>	-	-	l	aliases of <code>--[no-]file-line-error</code>
<code>-fmt=FMTNAME</code>	p	x	l	use FMTNAME instead of program name or a <code>%& line</code> ¹
<code>(-)-ini</code>	p	x	l	for dumping formats
<code>-ipc</code>	p	-	-	send DVI output to a socket as well as the usual output file
<code>-ipc-start</code>	p	-	-	as <code>-ipc</code> , and also start the server at the other end
<code>(-)-halt-on-error</code>	p	x	l	stop processing at the first error
<code>(-)-help</code>	p	x	l	display this help and exit
<code>(-)-version</code>	p	x	l	output version information and exit
<code>-8bit</code>	p	x	-	make all characters printable by default ²
<code>(-)-interaction=STRING</code>	p	x	l	set interaction mode (STRING = <code>batchmode</code> / <code>nonstopmode</code> / <code>scrollmode</code> / <code>errorstopmode</code>)
<code>(-)-jobname=STRING</code>	p	x	l	set the job name to STRING
<code>(-)-kpathsea-debug=NUMBER</code>	p	x	l	set path searching debugging flags according to the bits of NUMBER
<code>--lua=FILE</code>	-	-	l	Load and execute a lua initialization script.
<code>--luaonly</code>	-	-	l	run a lua file, then exit
<code>--luaconly</code>	-	-	l	byte-compile a lua file, then exit
<code>--luahashchars</code>	-	-	l	the bits used by current Lua interpreter for strings hashing
<code>(-)-[no-]mktexFMT=FMT</code>	p	x	l	disable/enable mktexFMT generation ³
<code>-mltex</code>	p	x	-	enable MLTeX extensions such as <code>\charsubdef</code>

¹in fact for lua \LaTeX the explanation deviates a bit: `--fmt=FORMAT`: load the format file **FORMAT**

²for x \LaTeX : don't use `^^X` sequences

³(**FMT**=`tex`/`tfm`/`pk`) for pdf \LaTeX ; else (**FMT**=`tex`/`tfm`)

<code>-no-pdf</code>	-	x	-	generate XDV (extended DVI) output rather than PDF
<code>--nosocket</code>	-	-	l	Disable the Lua socket library.
<code>(-)-output-comment=STRING</code>	p	x	l	use STRING for DVI file comment instead of date (no effect for PDF) ⁴
<code>(-)-output-directory=DIR</code>	p	x	l	use existing DIR as the directory to write files in
<code>(-)-output-format=FORMAT</code>	p	-	l	use FORMAT for job output; FORMAT is 'dvi' or 'pdf' ⁵
<code>-output-driver=CMD</code>	-	x	-	use CMD as the XDV-to-PDF driver instead of <code>xdvipdfmx</code>
<code>-papersize=STRING</code>	-	x	-	set PDF media size to STRING
<code>-[no-]parse-first-line</code>	p	x	-	disable/enable parsing of first line of input file
<code>(-)-progname=STRING</code>	p	x	l	set program (and fmt) name to STRING ⁶
<code>(-)-recorder</code>	p	x	l	enable filename recorder
<code>--safer</code>	-	-	l	Disable easily exploitable Lua commands.
<code>(-)-[no-]shell-escape</code>	p	x	l	disable/enable <code>\write18SHELL COMMAND</code> ⁷
<code>(-)-shell-restricted</code>	p	x	l	enable restricted <code>\write18</code> ⁸
<code>-src-specials</code>	p	x	-	insert source specials into the DVI file
<code>-src-specials=WHERE</code>	p	x	-	insert source specials in certain places of the DVI/XDV ⁹ file.
<code>(-)-syncTeX=NUMBER</code>	p	x	l	generate SyncTeX data for previewers ¹⁰
<code>-translate-file=TCXNAME</code>	p			use the TCX file TCXNAME ¹¹
<code>--utc</code>			l	Init time to UTC

Table 2: Options of T_EX engines in T_EX Live

pdf_lat_ex:

Usage: pdf_lat_ex [OPTION]... [TEXNAME[.tex]] [COMMANDS]

or: pdf_lat_ex [OPTION]... \FIRST-LINE

or: pdf_lat_ex [OPTION]... &FMT ARGS

Run pdf_lat_ex on TEXNAME, usually creating TEXNAME.pdf.

Any remaining COMMANDS are processed as pdf_lat_ex input, after TEXNAME is read.

If the first line of TEXNAME is %&FMT, and FMT is an existing .fmt file, use it. Else use 'NAME.fmt', where NAME is the program invocation name, most commonly 'pdf_lat_ex'.

Alternatively, if the first non-option argument begins with a backslash, interpret all non-option arguments as a line of pdf_lat_ex input.

Alternatively, if the first non-option argument begins with a &, the next word is taken as the FMT to read, overriding all else. Any remaining arguments are processed as above.

If no arguments or options are specified, prompt for input.

⁴For x_el_ate_x it is XDV instead of DVI and the remark (no effect for PDF) is missing

⁵x_el_ate_x offers option `-no-pdf` instead.

⁶l_ua_lat_ex does not mention (and fmt)

⁷For l_ua_lat_ex the explanation is disable/enable system commands

⁸For l_ua_lat_ex the explanation is restrict system commands to a list of commands given in texmf.cnf

⁹DVI for pdf_lat_ex; XDV for x_el_ate_x

¹⁰Explanation differs for l_ua_lat_ex

¹¹TCX means T_EX character translation

3 The options for MiKTeX

Since at the time of this writing, the author has no MiKTeX at hand, the results for MiKTeX are based on documentation, rather than experimentation. The three engines are a bit different, also in their names.

Well this section is preliminary only. It turned out that Section 2 is valid only for distribution T_EX Live. So in this section we venture to find out the options for the other big distribution, MiKTeX. We shall also investigate whether there are further distributions.

Whereas the description [KB23] seems not to mention the options explicitly, the MiKTeX manual [Sch22] describes each program in Section II, 6, in particular also the tex converters. This is the source of the following tables.

The first observation is that, for MiKTeX all options start with two dashes, whereas for T_EX Live this is the case only for luatex. One has to clarify, whether the maven latex plugin under consideration really works for MiKTeX.

option	included		explanation
--alias=name	p	x	1 Pretend to be program name, ... ¹²
--aux-directory=dir	p	x	1 Set dir as the directory to write auxiliary files to.
--buf-size=n	p	x	- Set the the maximum number of characters ...
--c-style-errors	p	x	1 Change the way, error messages are printed.
--credits	-	-	1 Display credits and exit ¹³ .
--disable-8bit-chars	p	x	- Make only 7-bit characters printable.
--disable/enable-installer	p	x	1 Disable/Enable automatic installation of packages.
--disable-write18	p	x	1 Disable the \write18{command} construct.
--enable-write18	p	x	1 Fully enable the \write18{command} construct ¹⁴ .
--restrict-write18	p	x	1 Partially enable the \write18command construct.
--debug-format	-	-	1 Enable format debugging ¹⁵ .
--[dont-]parse-first-line	p	x	- [Dont p]P]arse first line of input file under definite conditions ¹⁶
--draftmode	p	-	1 switch on draft mode (generates no output PDF) ¹⁷
--enable-8bit-chars	p	x	- Make all characters printable.
--enable-encTeX	p	-	- Enable encTeX extensions such as \mubyte ¹⁸ .
--enable-etex	p	x	- Enable eTeX extensions.
--enable-installer	p	x	1 Enable automatic installation of packages.
--enable-mltex	p	x	- Enable MLTeX extensions such as \charsubdef.
--error-line=n	p	x	- Set the width of context lines on ...error messages.
--extra-mem-bot=n	p	x	- Set the extra size ... for large data structures ...
--extra-mem-top=n	p	x	- Set the extra size (in memory words) for chars, tokens,
--font-max=n	p	x	- Set the maximum internal font number.
--font-mem-size=n	p	x	- Set the size, in TeX memory words, of the font memory.
--half-error-line=n	p	x	- Set the width of first lines of contexts in terminal error messages.
--halt-on-error	p	x	1 Quit after the first error.
--hash-extra=n	p	x	- Set the extra space for the hash table of control sequences ...
--help	p	x	1 Give help and exit ¹⁹ ..
--hhhelp	p	x	- manual page in an HTML Help window ²⁰
--include-directory=dir	p	x	1 Add the directory dir to [those] to be searched for input files.

¹²Using this option is equivalent to copying the program file to name and invoking name.

¹³The same as for T_EX Live.

¹⁴Corresponds roughly to (-)-shell-escape in T_EX Live.

¹⁵The same as for T_EX Live.

¹⁶Similar for T_EX Live. Note that there is also a converse option.

¹⁷Some differences in formulation between the converter and also between distributions

¹⁸Corresponds with -enc in T_EX Live.

¹⁹The same as for T_EX Live.

²⁰This option is only available on Windows systems.

--initialize	p	x	1	Become the INI variant of the program.
--interaction=mode	p	x	1	Set the interaction mode (<code>mode=batchmode/nonstopmode/scrollmode/errorstopmode</code>).
--job-name=name	p	x	1	Set the name of the job (<code>\jobname</code>).
--job-time=file	p	x	-	Set the time-stamp of all output files equal to file's time-stamp.
--lua=FILE	-	-	1	load and execute a lua initialization script ²¹ .
--luaonly	-	-	1	Start LuaTeX as a Lua interpreter ²² .
--luaonly	-	-	1	byte-compile a lua file, then exit ²³ .
--luahashchars	-	-	1	the bits used by current Lua interpreter for strings hashing
--main-memory=n	p	x	-	Change the total size ... of the main memory array.
--max-in-open=n	p	x	-	Set the maximum number of input files ...
--max-print-line=n	p	x	-	Set the width of longest text lines output.
--max-strings=n	p	x	-	Set the maximum number of strings.
--[no-]mktex=fmt	-	-	1	Enable/Disable <code>fmt</code> generation, where <code>fmt</code> must be either <code>tex</code> or <code>tfm</code> .
--nest-size=n	p	x	-	Set the maximum number of semantic levels simultaneously active.
--no-c-style-errors	p	x	1	Don't change the way, error messages are printed.
--no-pdf	-	x	-	generate XDV (extended DVI) output rather than PDF
--nosocket	-	-	1	Disable the Lua socket library.
--output-comment=string	-	-	1	Use <code>string</code> for DVI file comment instead of date.
--output-directory=dir	p	x	1	Write output files in <code>dir</code> ²⁴ .
--output-driver=CMD	-	x	-	use <code>CMD</code> as the XDV-to-PDF driver instead of <code>xdvipdfmx</code>
--output-format=format	p	-	1	Use format for job output (one of: <code>dvi</code> , <code>pdf</code>) ²⁵ .
--papersize=STRING	-	x	-	set PDF media size to <code>STRING</code>
--param-size=n	p	x	-	Set the the maximum number of simultaneous macro parameters.
--pool-free=n	p	x	-	Set the minimum pool space left after loading the format.
--pool-size=n	p	x	-	Set the maximum number of characters in strings, ...
--quiet	p	x	-	Suppress all output, except errors.
--record-package-usages=file	p	x	-	Record all package usages and write them into <code>file</code> .
--recorder	p	x	1	Enable the file name recorder ²⁶ .
--safer	-	-	1	Disable easily exploitable Lua commands ²⁷ .
--save-size=n	p	x	-	Set the the amount of space for saving values outside of current group.
--src-specials	p	x	-	Embed source file information in the DVI file ²⁸ .
--stack-size=n	p	x	-	Set the maximum number of simultaneous input sources.
--string-vacancies=n	p	x	-	Set the minimum number of characters ...
--synctex=n	p	x	1	Generate SyncTeX data for previewers ²⁹
--tcx=tcxname	p	-	-	Use the <code>tcxname</code> translation table ...
--time-statistics	p	x	-	Show processing time statistics.
--trace[=tracestreams]	p	x	-	Enable trace messages.
--trie-size=n	p	x	-	Set the amount of space for hyphenation patterns.
--undump=name	p	x	1	Use name as the name of the format to be used, ...
--utc	-	-	1	Init time to UTC ³⁰ .
--version	p	x	1	Show version information and exit ³¹ .

Table 3: Options of T_EX engines in MiKTeX

²¹The same as for T_EX Live.

²²Could be the same as for T_EX Live.

²³Could be the same as for T_EX Live.

²⁴Similar as for T_EX Live.

²⁵`pdflatex` and `lualatex` differ a bit in text. Seems similar to T_EX Live.

²⁶The same as in T_EX Live.

²⁷The same as for T_EX Live.

²⁸Similar as in T_EX Live.

²⁹Explanation with more detail than for T_EX Live.

³⁰The same as for T_EX Live.

³¹The same as for T_EX Live.

Strange, there are `--enable-etex` and `--enable-mltex` but no way to disable. Maybe disable is the default.

```
miktex-pdfTeX [option...] [[file] | [\command...]]
```

```
miktex-luatex [option...] [[command...] | [file]]
```

The following options are ignored:

`--8bit`, `--etex`, `--parse-first-line`, `--no-parse-first-line`
These are always on.

`--default-translate-file=tcxname`, `--translate-file=tcxname`
These are always off.

```
miktex-xetex [option...] [[file] | [\command...]]
```

4 To be clarified

Note that `xelatex` works as the other engines for PDF, whereas it has XDV instead of DVI as alternative format. Thus the format DVI is ignored. See the manual.

5 References

- [HHHS23] H. Hagen, H. Henkel, T. Hoekwater, and L. Scarso. *LuaTEX Reference Manual*, 2 2023. A copy is within the documentation of this software.
- [KB23] editor K. Berry. *The TeX Live Guide—2023*, 2 2023. A copy is within the documentation of this software.
- [RHB23] W. Robertson, K. Hosny, and K. Berry. *The XETEX reference guide*, 2 2023. A copy is within the documentation of this software.
- [Sch22] C. Schenk. MiKTeX Manual. <https://docs.miktex.org/manual/>, 2022.
- [THHB23] Han The Thanh, H. Hagen, H. Henkel, and K. Berry. *The pdfTEX user manual*, 2 2023. A copy is within the documentation of this software.