The **pdfcrypt** package

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Abstract

This package supports the setting of pdf encryption options for VT_EX and some older versions of pdfT_EX.

Contents

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*Please report any issues at https://github.com/ho-tex/oberdiek/issues

1 Documentation

This package allows the setting of pdf encryption options for

- VTEX, since version 7.35, http://www.micropress-inc.com/.

- pdfTEX, patched by Ricardo Sanchez Carmenes[1].
  Some supported versions are:

  > pdfTEX-1.00a,
  > pdfTEX-0.14h-pdfcrypt-20010310,
  > pdfcrypt-20010331

Note: Since pdfTEX-1.10a (2003-01-16) encryption support was dropped! Thus the package is now obsolete for recent pdfTEX versions.

1.1 Alternatives

There are free alternatives, programs that can be used for postprocessing the pdf file:

- pdftk
  http://www.accesspdf.com/pdftk/

- Multivalent
  http://multivalent.sourceforge.net/

- PDFBox
  http://www.pdfbox.org/

- PDFTrans
  http://maddingue.free.fr/softwares/pdftrans.html

- . . .

1.2 Usage

The options can be set as package options or with the command `\pdfcryptsetup`:

> owner=⟨*owner password*⟩
> user=⟨*user password*⟩
> `print`, `copy`, `edit`, `annotate=true`, `false`
> `all`, `none`
> `debug`

The encryption is set at `\begin{document}` by default, but this can be forced for an earlier time using the option `set`. Example:

> `\usepackage[owner=Donald,user=Knuth,print=false]{pdfcrypt}`
> . . .
> `\begin{document}`

or

> `\usepackage{pdfcrypt}`
> `\pdfcryptsetup{owner=Donald,user=Knut}`
> `\pdfcryptsetup{print=false,set}`
> . . .
> `\begin{document}`

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[1]Ricardo Sanchez Carmenes's email address: carmenes@bioquimica.uniovi.es

1.2.1 Special characters

The characters '{', '}', and '\' have to be escaped with '\'. Then the string should not be specified as package option but with the macro \pdfcryptsetup, eg:

```
\pdfcryptsetup{user={\{\\Hello\}},print=false}
```

The password here is "{\Hello}". Active characters can be used and are not expanded. Macros except for \{, \}, and \\ should not be used and are not expanded.

1.2.2 \nopdfcrypt

Often the whole process of pdf generation includes several TEX compilations and perhaps other postprocessing steps. Therefore a feature would be useful to disable the encryption stuff in order to speed up the first compilations. Therefore package pdfcrypt will look for the macro \nopdfcrypt. If it has the meaning of the letter 'Y', the package will be disabled. Example:

```
pdflatex '\let\nopdfcrypt=Y\input myfile'
thumbpdf myfile
pdfelatex myfile
```

1.2.3 Configuration file

If the file pdfcrypt.cfg exists it is loaded and can be used for common settings.

1.2.4 Support for plain TEX

The package can also be used with plain TEX. It defines the missing LATEX macros and loads package keyval. The configuration file is not supported and automatically loaded.

1.3 Hints for pdfTEX

This section is out of date, because the encryption support was removed from pdfTEX. Therefore this hints are of historical interest only.

```
* There are packages such as thumbpdf that ship out
  some stuff (\immediate\pdfobj{...}). In these cases
  \pdfcrypt will be ignored without warning or error
  message. Therefore the package pdfcrypt should be
  loaded before and option "set" should be used in
  order to force the call of \pdfcrypt, for example:
    \usepackage{pdfcrypt}
    \pdfcryptsetup{..., set}
    ...
    \usepackage{thumbpdf}

* Compiling pdfTeX (eg. version 1.00a-pretest-20010804):
  pdfTeX versions are available at
      ftp://ftp.cstug.cz/pub/tex/local/cstug/thanh/pdftex/snapshots/
  Unpack the latest .tgz file:
      > tar xzf pdftex-20010804.tgz
  Enable encryption support:
      src> cd src/texk/web2c/pdftexdir
      src/texk/web2c/pdftexdir> ln -fs pdfcrypt-full.c pdfcrypt.c
  Compile:
      src/texk/web2c/pdftexdir> cd ../../..
      src> ./configure
      src> cd texk/web2c
      src/texk/web2c> make pdftexbin
  At last install the binary and pool files.
```

2 Implementation

2.1 Help macros for plain TₑX

```
2 \expandafter\edef\csname pc@endinput\endcsname{%
3   \catcode`\noexpand\@=\the\catcode`\@\relax
4   \noexpand\endinput
5 }
6 \catcode`\@=11 %
7
8 \expandafter\ifx\csname @firstoftwo\endcsname\relax
9   \long\def\@firstoftwo#1#2{#1}%
10 \fi
11
12 \expandafter\ifx\csname @secondoftwo\endcsname\relax
13   \long\def\@secondoftwo#1#2{#2}%
14 \fi
15
16 \expandafter\ifx\csname @ifundefined\endcsname\relax
17   \def\@ifundefined#1{%
18     \expandafter\ifx\csname #1\endcsname\relax
19       \expandafter\@firstoftwo
20     \else
21       \expandafter\@secondoftwo
22     \fi
23   }%
24 \fi
25
26 \@ifundefined{@ifnextchar}{%
27   \long\def\@ifnextchar#1#2#3{%
28     \let\reserved@d=#1%
29     \def\reserved@a{#2}%
30     \def\reserved@b{#3}%
31     \futurelet\@let@token\@ifnch
32   }%
33   \def\@ifnch{%
34     \ifx\@let@token\@sptoken
35       \let\reserved@c\@xifnch
36     \else
37       \ifx\@let@token\reserved@d
38         \let\reserved@c\reserved@a
39       \else
40         \let\reserved@c\reserved@b
41       \fi
42     \fi
43     \reserved@c
44   }%
45   \begingroup
46     \def\:{\global\let\@sptoken= }%
47     \: %
48     \def\:{\@xifnch}%
49     \expandafter\gdef\: {\futurelet\@let@token\@ifnch}%
50   \endgroup
51 }{}
52
53 \@ifundefined{ProvidesPackage}{%
54   \def\ProvidesPackage#1{%
55     \@ifnextchar[{\pc@ProvidesPackage{#1}}%
56                 {\pc@ProvidesPackage{#1}[]}%
57   }%
58   \def\pc@ProvidesPackage#1[#2]{%
```

```
59    \immediate\write-1{Package: #1 #2}%
60  }%
61 }{}
62
63 \begingroup\expandafter\expandafter\expandafter\endgroup
64 \expandafter\ifx\csname RequirePackage\endcsname\relax
65   \input infwarerr.sty\relax
66 \else
67   \RequirePackage{infwarerr}%
68 \fi
69
70 \@ifundefined{@gobble}{%
71   \long\def\@gobble#1{}%
72 }{}
73
74 \@ifundefined{@empty}{%
75   \def\@empty{}%
76 }{}
```

2.2 Package Identification and checks

```
77 \ProvidesPackage{pdfcrypt}%
78   [2016/05/16 v1.1 Allows the setting of PDF encryption (HO)]%

79 \@ifundefined{pdfcryptsetup}{%
80   \let\pdfcryptsetup\@gobble
81 }{%
82   \@PackageWarningNoLine{pdfcrypt}{Package pdfcrypt is already loaded}%
83   \pc@endinput
84 }
```

Support for \nopdfcrypt.
```
85 \newif\ifpc@nopdfcrypt
86 \ifx Y\nopdfcrypt
87   \@PackageWarningNoLine{pdfcrypt}{%
88     Encryption disabled by \string \nopdfcrypt\space request%
89   }%
90   \global\pc@nopdfcrypttrue
91 \fi
```

2.3 Driver detection

```
92 \let\pc@driver\@empty
93 \begingroup
94   % pdfTeX detection
95   \@ifundefined{pdfoutput}{%
96   }{%
97     \ifcase\pdfoutput
98     \else
99       \@ifundefined{pdfcrypt}{%
100        \@PackageError{pdfcrypt}{%
101          PDF encryption is not supported with this pdfTeX%
102        }{%
103          Encryption support was added in 0.14h (2001/03/10)\MessageBreak
104          and removed in 1.10a (2003/01/16).%
105        }%
106        \endgroup
107        \pc@endinput
108      }{%
109        \gdef\pc@driver{pdftex}%
110      }%
111    \fi
112  }%
113  % VTeX detection
114  \@ifundefined{OpMode}{%
```

```
115  }{%
116    \ifnum\OpMode=1 %
117      \ifnum\@ifundefined{VTeXversion}0\VTeXversion<735 %
118        \@PackageError{pdfcrypt}{%
119          PDF encryption is not supported with this VTeX%
120        }{%
121          You need VTeX 7.35 or higher.%
122        }%
123        \endgroup
124        \pc@endinput
125      \else
126        \gdef\pc@driver{vtex}%
127      \fi
128    \fi
129  }%
130 \endgroup
```

2.4   Load package **keyval**

```
131 \@ifundefined{@makeother}{%
132   \def\@makeother#1{\catcode`#1=12\relax}%
133 }{}
134
135 \@ifundefined{g@addto@macro}{%
136   \long\def\g@addto@macro#1#2{%
137     \begingroup
138       \toks@\expandafter{#1#2}%
139       \xdef#1{\the\toks@}%
140     \endgroup
141   }%
142 }{}
143
144 \@ifundefined{@namedef}{%
145   \def\@namedef#1{\expandafter\def\csname#1\endcsname}%
146 }{}
147
148 \@ifundefined{@nameuse}{%
149   \def\@nameuse#1{\csname #1\endcsname}%
150 }{}
151
152 \def\pc@KeyvalRestore{%
153   \let\pc@KeyvalRestore\@undefined
154 }
155
156 \let\pcOrg@NeedsTeXFormat\NeedsTeXFormat
157 \@ifundefined{NeedsTeXFormat}{%
158   \def\NeedsTeXFormat#1{}%
159   \g@addto@macro\pc@KeyvalRestore{%
160     \let\NeedsTeXFormat\pcOrg@NeedsTeXFormat
161   }%
162 }{}
163
164 \let\pcOrg@DeclareOption\DeclareOption
165 \@ifundefined{DeclareOption}{%
166   \def\DeclareOption#1#2{#2}%
167   \g@addto@macro\pc@KeyvalRestore{%
168     \let\DeclareOption\pcOrg@DeclareOption
169   }%
170 }{}
171
172 \let\pcOrg@ExecuteOptions\ExecuteOptions
173 \@ifundefined{ExecuteOptions}{%
174   \def\ExecuteOptions#1{}%
```

```
175    \g@addto@macro\pc@KeyvalRestore{%
176      \let\ExecuteOptions\pcOrg@ExecuteOptions
177    }%
178 }{}
179
180 \let\pcOrg@ProcessOptions\ProcessOptions
181 \@ifundefined{ProcessOptions}{%
182    \def\ProcessOptions{}%
183    \g@addto@macro\pc@KeyvalRestore{%
184      \let\ProcessOptions\pcOrg@ProcessOptions
185    }%
186 }{}%
187
188 \begingroup\expandafter\expandafter\expandafter\endgroup
189 \expandafter\ifx\csname RequirePackage\endcsname\relax
190    \input keyval.sty\relax
191 \else
192    \RequirePackage{keyval}%
193 \fi
194 \pc@KeyvalRestore
```

2.5   Define options

```
195 \@ifundefined{@dblarg}{%
196    \long\def\@dblarg#1{\@ifnextchar[{#1}{\@xdblarg{#1}}}%
197    \long\def\@xdblarg#1#2{#1[{#2}]{#2}}%
198 }{}
199
200 \newif\ifpc@set
201 \newif\ifpc@print
202 \newif\ifpc@copy
203 \newif\ifpc@edit
204 \newif\ifpc@annotate
205 \newif\ifpc@debug
206 \let\pc@owner\@empty
207 \let\pc@user\@empty
208
209 % default: allow all
210 \pc@printtrue
211 \pc@copytrue
212 \pc@edittrue
213 \pc@annotatetrue
214
215 \edef\pc@temp{\catcode`\noexpand\"=\the\catcode`\"\relax}
216 \@makeother\"
217 \def\pc@set{%
218    \@PackageInfo{pdfcrypt}{%
219      \ifpc@debug
220        \ifx\pc@owner\@empty
221          No owner password%
222        \else
223          Owner password: `\pc@owner'%
224        \fi
225        \MessageBreak
226        \ifx\pc@user\@empty
227          No user password%
228        \else
229          User password: `\pc@user'%
230        \fi
231        \MessageBreak
232        Flags: %
233        \ifpc@print    \else no\fi print, %
234        \ifpc@copy     \else no\fi copy, %
```

```
235      \ifpc@edit   \else no\fi edit, %
236      \ifpc@annotate\else no\fi annotate%
237      \MessageBreak
238    \fi
239    \ifpc@nopdfcrypt
240      Encryption is disabled by '\string\nopdfcrypt'%
241    \else
242      Encryption is set for '\pc@driver'%
243    \fi
244  }%
245  \ifpc@nopdfcrypt
246  \else
247    \@ifundefined{pc@set@\pc@driver}{%
248      \ifx\pc@driver\@empty
249        \@PackageError{pdfcrypt}{No driver for encryption %
250          support found}\@ehc
251      \else
252        \@PackageError{pdfcrypt}{Cannot set encryption for %
253          unknown driver '\pc@driver'}\@ehc
254      \fi
255    }{%
256      \@nameuse{pc@set@\pc@driver}%
257    }%
258  \fi
259 }
260 \def\pc@set@pdftex{%
261   \ifnum\pdftexversion<100 %
262     \pc@set@pdftexold
263   \else
264     \pc@set@pdftexnew
265   \fi
266 }
267 \def\pc@set@pdftexold{%
268   \pdfcrypt{%
269     owner "\pc@owner" %
270     user "\pc@user" %
271     \ifpc@print   \else no\fi print %
272     \ifpc@copy    \else no\fi copy %
273     \ifpc@edit    \else no\fi edit %
274     \ifpc@annotate\else no\fi annotate%
275   }%
276 }
277 \def\pc@set@pdftexnew{%
278   \pdfcrypt
279     owner{\pc@owner}%
280     user{\pc@user}%
281     \ifpc@print   \else no\fi print %
282     \ifpc@copy    \else no\fi copy %
283     \ifpc@edit    \else no\fi edit %
284     \ifpc@annotate\else no\fi annotate%
285   \relax
286 }
287 \def\pc@set@vtex{%
288   \immediate\special{!security %
289     O=\pc@MakeVTeXString\pc@owner,%
290     U=\pc@MakeVTeXString\pc@user,%
291     P\ifpc@print +\else -\fi,%
292     C\ifpc@copy +\else -\fi,%
293     M\ifpc@edit +\else -\fi,%
294     A\ifpc@annotate +\else -\fi
295   }%
296 }
```

```
297 \def\pc@MakeVTeXString#1{%
298   "\expandafter\pc@@MakeVTeXString#1"\@nil"%
299 }
300 \def\pc@@MakeVTeXString#1"#2\@nil{%
301   #1%
302   \ifx\\#2\\%
303   \else
304     ""%
305     \@ReturnAfterFi{%
306       \pc@@MakeVTeXString#2\@nil
307     }%
308   \fi
309 }
310 \long\def\@ReturnAfterFi#1\fi{\fi#1}
311 \pc@temp
312
313 \begingroup
314   \catcode`\ =12 \gdef\pc@spaceother{ }\catcode`\ =10\relax
315   \catcode`\|=0 %
316   \catcode`\\=12 %
317   |gdef|pc@DefString#1#2{%
318     |def#1{#2}%
319     |edef#1{|expandafter|strip@prefix|meaning#1}%
320     |edef#1{|expandafter|pc@SpaceToOther#1 |@nil}%
321     |edef#1{|expandafter|pc@EscapeRemove#1|@empty\|@empty|@nil}%
322   }%
323   |gdef|pc@EscapeRemove#1\#2#3|@nil{%
324     #1#2%
325     |ifx|\#3|\%%
326     |else
327       |@ReturnAfterFi{%
328         |pc@EscapeRemove#3|@nil
329       }%
330     |fi
331   }%
332 |endgroup
333 \def\pc@SpaceToOther#1 #2\@nil{%
334   #1%
335   \ifx\\#2\\%
336   \else
337     \pc@spaceother
338     \@ReturnAfterFi{%
339       \pc@SpaceToOther#2\@nil
340     }%
341   \fi
342 }
343
344 \def\pc@boolkey{\@dblarg\pc@@boolkey}
345 \def\pc@@boolkey[#1]#2#3{%
346   \lowercase{\def\pc@temp{#3}}%
347   \ifx\pc@temp\@empty
348     \let\pc@temp\pc@true
349   \fi
350   \ifx\pc@temp\pc@true
351   \else
352     \ifx\pc@temp\pc@false
353     \else
354       \let\pc@temp\relax
355     \fi
356   \fi
357   \ifx\pc@temp\relax
358     \@PackageWarning{pdfcrypt}{%
```

```
359        Unexpected value \string'#3\string' of %
360        option \string'#2\string'\MessageBreak
361        instead of %
362        \string'true\string' or \string'false\string'%
363      }%
364    \else
365      \csname pc@#2\pc@temp\endcsname
366    \fi
367 }
368 \def\pc@true{true}
369 \def\pc@false{false}
370
371 \define@key{pc}{set}[true]{%
372    \pc@boolkey{set}{#1}%
373 }
374 \define@key{pc}{pdftex}[]{%
375    \def\pc@driver{pdftex}%
376 }
377 \define@key{pc}{vtex}[]{%
378    \def\pc@driver{vtex}%
379 }
380 \define@key{pc}{print}[true]{%
381    \pc@boolkey{print}{#1}%
382 }
383 \define@key{pc}{copy}[true]{%
384    \pc@boolkey{copy}{#1}%
385 }
386 \define@key{pc}{edit}[true]{%
387    \pc@boolkey{edit}{#1}%
388 }
389 \define@key{pc}{annotate}[true]{%
390    \pc@boolkey{annotate}{#1}%
391 }
392 \define@key{pc}{all}[]{%
393    \pc@boolkey{print}{true}%
394    \pc@boolkey{copy}{true}%
395    \pc@boolkey{edit}{true}%
396    \pc@boolkey{annotate}{true}%
397 }
398 \define@key{pc}{none}[]{%
399    \pc@boolkey{print}{false}%
400    \pc@boolkey{copy}{false}%
401    \pc@boolkey{edit}{false}%
402    \pc@boolkey{annotate}{false}%
403 }
404
405 \define@key{pc}{owner}{%
406    \pc@DefString\pc@owner{#1}%
407 }
408 \define@key{pc}{user}{%
409    \pc@DefString\pc@user{#1}%
410 }
411 \define@key{pc}{debug}[true]{%
412    \pc@boolkey{debug}{#1}%
413 }
414
415 \def\pdfcryptsetup#1{%
416    \setkeys{pc}{#1}%
417    \ifpc@set
418      \pc@set
419      \global\let\pc@set\relax
420      \gdef\pdfcryptsetup##1{%
```

```
421      \@PackageWarning{pdfcrypt}{%
422        Encryption options are already set\MessageBreak
423        new values are ignored%
424      }%
425    }%
426  \fi
427 }
428 \begingroup\expandafter\expandafter\expandafter\endgroup
429 \expandafter\ifx\csname @onlypreamble\endcsname\relax
430 \else
431   \@onlypreamble\pdfcryptsetup
432 \fi
```

2.6 support of configuration file

```
433 \begingroup\expandafter\expandafter\expandafter\endgroup
434 \expandafter\ifx\csname InputIfFileExists\endcsname\relax
435   \@PackageInfo{pdfcrypt}{%
436     Configuration file pdfcrypt.cfg not supported.%
437   }%
438 \else
439   \let\pc@ExecuteOptions\ExecuteOptions
440   \InputIfFileExists{pdfcrypt.cfg}{}{}%
441   \let\ExecuteOptions\pc@ExecuteOptions
442 \fi
```

2.7 Package options

Plain format does not know package options.

```
443 \begingroup\expandafter\expandafter\expandafter\endgroup
444 \expandafter\ifx\csname @classoptionslist\endcsname\relax
445   \expandafter\pc@endinput
446 \fi
```

Process global and local options.

```
447 \def\pc@ProcessOptionsWithKV{%
448   \let\pc@temp\@empty
449   \@for\CurrentOption:=\@classoptionslist\do{%
450     \@ifundefined{KV@pc@\CurrentOption}{}{%
451       \edef\pc@temp{\pc@temp,\CurrentOption,}%
452       \@expandtwoargs\@removeelement\CurrentOption
453         \@unusedoptionlist\@unusedoptionlist
454     }%
455   }%
456   \edef\pc@temp{%
457     \noexpand\pdfcryptsetup{%
458       \pc@temp\@ptionlist{\@currname.\@currext}%
459     }%
460   }%
461   \pc@temp
462 }
463 \pc@ProcessOptionsWithKV
464 \AtEndOfPackage{\let\@unprocessedoptions\relax}
465 \AtBeginDocument{\pc@set}
466
467 \pc@endinput
468 ⟨/package⟩
```

3 Installation

3.1 Download

Package. This package is available on CTAN[2]:

`CTAN:macros/latex/contrib/oberdiek/pdfcrypt.dtx` The source file.

`CTAN:macros/latex/contrib/oberdiek/pdfcrypt.pdf` Documentation.

Bundle. All the packages of the bundle 'oberdiek' are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

`CTAN:install/macros/latex/contrib/oberdiek.tds.zip`

TDS refers to the standard "A Directory Structure for TeX Files" (`CTAN:pkg/tds`). Directories with `texmf` in their name are usually organized this way.

3.2 Bundle installation

Unpacking. Unpack the `oberdiek.tds.zip` in the TDS tree (also known as `texmf` tree) of your choice. Example (linux):

    unzip oberdiek.tds.zip -d ~/texmf

3.3 Package installation

Unpacking. The `.dtx` file is a self-extracting `docstrip` archive. The files are extracted by running the `.dtx` through plain TeX:

    tex pdfcrypt.dtx

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

    pdfcrypt.sty → tex/generic/oberdiek/pdfcrypt.sty
    pdfcrypt.pdf → doc/latex/oberdiek/pdfcrypt.pdf
    pdfcrypt.dtx → source/latex/oberdiek/pdfcrypt.dtx

If you have a `docstrip.cfg` that configures and enables `docstrip`'s TDS installing feature, then some files can already be in the right place, see the documentation of `docstrip`.

3.4 Refresh file name databases

If your TeX distribution (TeX Live, MiKTeX, ...) relies on file name databases, you must refresh these. For example, TeX Live users run `texhash` or `mktexlsr`.

3.5 Some details for the interested

Unpacking with LaTeX. The `.dtx` chooses its action depending on the format:

plain TeX: Run `docstrip` and extract the files.

LaTeX: Generate the documentation.

If you insist on using LaTeX for `docstrip` (really, `docstrip` does not need LaTeX), then inform the autodetect routine about your intention:

    latex \let\install=y\input{pdfcrypt.dtx}

Do not forget to quote the argument according to the demands of your shell.

---

[2]`CTAN:pkg/pdfcrypt`

Generating the documentation. You can use both the `.dtx` or the `.drv` to generate the documentation. The process can be configured by the configuration file `ltxdoc.cfg`. For instance, put this line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfLATEX:

```
pdflatex pdfcrypt.dtx
makeindex -s gind.ist pdfcrypt.idx
pdflatex pdfcrypt.dtx
makeindex -s gind.ist pdfcrypt.idx
pdflatex pdfcrypt.dtx
```

4 History

[2001/04/02 v0.1]

- First public version, published in the pdftex mailing list for testing with pdfcrypt-20010331

[2001/07/19 v0.2]

- Default: all allowed.
- Support for VTEX added.

[2001/07/19 v0.3]

- Bug fix: VTEX letter for edit is M (modify).

[2001/07/19 v0.4]

- Bug fix: `\VTeXversion` is correct after regenerating the format file.

[2001/08/05 v0.5]

- Syntax change in pdfTEX 1.00a.

[2001/08/09 v0.6]

- Support of special characters:
  input: \{, \}, \\ for {, }, \
  output: " in VTEX
- Option debug added.

[2001/10/28 v0.7]

- Plain compatibility.
- `\nopdfcrypt` added.
- Typos corrected.

[2006/02/20 v0.8]

- Obsolete remarks for pdfTEX.
- DTX framework.
- LPPL 1.3

[2007/04/11 v0.9]

- Line ends sanitized.

[2007/04/26 v1.0]

- Use of package infwarerr.

[2016/05/16 v1.1]

- Documentation updates.

5 Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

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