

# The atveryend package

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## Abstract

This  $\text{\LaTeX}$  package provides two hooks for `\end{document}` that are executed after the hook of `\AtEndDocument`. `\AfterLastShipout` can be used for code that is to be executed right after the last `\clearpage` before the `.aux` file is closed. `\AtVeryEndDocument` is used for code after closing and final reading of the `.aux` file.

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## 1 Documentation

There are packages (e.g. `hyperref` [4], `lastpage` [6]) that want to call code after the typesetting is done, for example to remember the last page number.  $\text{\LaTeX}$  provides the hook `\AtEndDocument` (clsguide [1]). There are packages that use this hook to do their job for typesetting pages (e.g. `endfloat` emits the floats here [2]). Also a user might provide additional code in `\AtEndDocument`. Therefore packages have to call `\clearpage` in `\AtEndDocument` to get after the last shipout page. But this is not too reliable, because the right timing is important between packages that want or have to do things before the last page is output and packages that only work properly if they can reach the point after the last shipout.

Therefore the task of this package is to provide additional hooks for `\end{document}`. All hooks are called after the hook of `\AtEndDocument`.

`\BeforeClearDocument {<code>}`

The code is called before the final `\clearpage` in `\enddocument`. However it is unknown, whether the last page is already shipped out or if this will be triggered by the final `\clearpage`.

`\AfterLastShipout {<code>}`

The code is called after the final `\clearpage` of `\enddocument` before the main `.aux` file is closed. This is the right place to remember the last page in the `.aux` file, for instance.

`\AtVeryEndDocument {<code>}`

The code is called after the `.aux` file is closed and read in again. It is the place for final checks, rerun hints, final messages.

`\AtEndAfterFileList {<code>}`

After the `.aux` file closing and reading  $\text{\LaTeX}$  prints the file list if requested by `\listfiles`. Then this hook is executed.

`\AtVeryVeryEnd {<code>}`

This code is called right before the final `\@@end`.

### 1.1 Related work

**Package `scrfile`:** Markus Kohm has written package `scrfile` (part of KOMA-Script [5]) that provides hooks `\BeforeClosingMainAux` and `\AfterReadingMainAux`.

They have the same function as the hooks of this package. In fact this package uses them, if they are available.

**Class `revtex4-1`:** This class calls `\clear@document` in `\enddocument` that wraps the final call of `\clearpage`. Thus it can be used as hook to call stuff after that `\clearpage`. This is also done by this package.

**Package `etoolbox`:** It provides `\AfterEndDocument`, a hook right before `\deadcycles` or `\@@end` [3].

This package tries to combine as many approaches as possible:

- It looks for a known `\enddocument` and redefines it.
- Hooks that are provided by others are used (package `scrfile` or class `revtex4-1`).
- It redefines `\@checkend` and `\@dofilelist` to insert the hooks similar to `packagescrfile`.
- The hook execution is wrapped in a macro that is redefined by its first call to prevent calling the hook more than once.

## 2 Implementation

```

1 (*package)
2 \begingroup\catcode61\catcode48\catcode32=10\relax%
3 \catcode13=5 % ^^M
4 \endlinechar=13 %
5 \catcode123=1 % {
6 \catcode125=2 % }
7 \catcode64=11 % @
8 \def\x{\endgroup
9   \expandafter\edef\csname AtVeryEnd@AtEnd\endcsname{%
10     \endlinechar=\the\endlinechar\relax
11     \catcode13=\the\catcode13\relax
12     \catcode32=\the\catcode32\relax
13     \catcode35=\the\catcode35\relax
14     \catcode61=\the\catcode61\relax
15     \catcode64=\the\catcode64\relax
16     \catcode123=\the\catcode123\relax
17     \catcode125=\the\catcode125\relax
18   }%
19 }%
20 \x\catcode61\catcode48\catcode32=10\relax%
21 \catcode13=5 % ^^M
22 \endlinechar=13 %
23 \catcode35=6 % #
24 \catcode64=11 % @
25 \catcode123=1 % {
26 \catcode125=2 % }
27 \def\TMP@EnsureCode#1#2{%
28   \edef\AtVeryEnd@AtEnd{%
29     \AtVeryEnd@AtEnd
30     \catcode#1=\the\catcode#1\relax
31   }%
32   \catcode#1=#2\relax
33 }
34 \TMP@EnsureCode{9}{10}% (tab)
35 \TMP@EnsureCode{39}{12}% '
36 \TMP@EnsureCode{40}{12}% (
37 \TMP@EnsureCode{41}{12}% )
38 \TMP@EnsureCode{42}{12}% *

```

```

39 \TMP@EnsureCode{45}{12}% -
40 \TMP@EnsureCode{46}{12}% .
41 \TMP@EnsureCode{47}{12}% /
42 \TMP@EnsureCode{62}{12}% >
43 \TMP@EnsureCode{91}{12}% [
44 \TMP@EnsureCode{93}{12}% ]
45 \TMP@EnsureCode{96}{12}% ‘
46 \edef\AtVeryEnd@AtEnd{\AtVeryEnd@AtEnd\noexpand\endinput}

Package identification.
47 \NeedsTeXFormat{LaTeX2e}
48 \ProvidesPackage{atveryend}%
49 [2011/04/15 v1.6 Hooks at very end of document (HO)]

```

## 2.1 Hooks

ryEnd@BeforeClearDocumentHook

```
50 \let\AtVeryEnd@BeforeClearDocumentHook\@empty
```

tVeryEnd@AfterLastShipoutHook

```
51 \let\AtVeryEnd@AfterLastShipoutHook\@empty
```

VeryEnd@AtVeryEndDocumentHook

```
52 \let\AtVeryEnd@AtVeryEndDocumentHook\@empty
```

eryEnd@AtEndAfterFileListHook

```
53 \let\AtVeryEnd@AtEndAfterFileListHook\@empty
```

\AtVeryEnd@AtVeryVeryEndHook

```
54 \let\AtVeryEnd@AtVeryVeryEndHook\@empty
```

\BeforeClearDocument

```

55 \newcommand*{\BeforeClearDocument}{%
56   \g@addto@macro\AtVeryEnd@BeforeClearDocumentHook
57 }

```

\AfterLastShipout

```

58 \newcommand*{\AfterLastShipout}{%
59   \g@addto@macro\AtVeryEnd@AfterLastShipoutHook
60 }

```

\AtVeryEndDocument

```

61 \newcommand*{\AtVeryEndDocument}{%
62   \g@addto@macro\AtVeryEnd@AtVeryEndDocumentHook
63 }

```

\AtEndAfterFileList

```

64 \newcommand*{\AtEndAfterFileList}{%
65   \g@addto@macro\AtVeryEnd@AtEndAfterFileListHook
66 }

```

\AtVeryVeryEnd

```

67 \newcommand*{\AtVeryVeryEnd}{%
68   \g@addto@macro\AtVeryEnd@AtVeryVeryEndHook
69 }

```

\Call@BeforeClearDocument

```

70 \newcommand*{\Call@BeforeClearDocument}{%
71   \let\BeforeClearDocument\@firstofone
72   \ifx\AtVeryEnd@BeforeClearDocumentHook\@empty
73     \PackageInfo{atveryend}{Empty hook ‘BeforeClearDocument’}%

```

```

74 \else
75   \PackageInfo{atveryend}{Executing hook 'BeforeClearDocument'}}%
76   \AtVeryEnd@BeforeClearDocumentHook
77 \fi
78 \global\let\AtVeryEnd@BeforeClearDocumentHook\@undefined
79 \global\let\Call@BeforeClearDocument\relax
80 }

```

\Call@AfterLastShipout

```

81 \newcommand*{\Call@AfterLastShipout}{%
82   \let\AfterLastShipout\@firstofone
83   \ifx\AtVeryEnd@AfterLastShipoutHook\@empty
84     \PackageInfo{atveryend}{Empty hook 'AfterLastShipout'}}%
85   \else
86     \PackageInfo{atveryend}{Executing hook 'AfterLastShipout'}}%
87     \AtVeryEnd@AfterLastShipoutHook
88   \fi
89   \global\let\AtVeryEnd@AfterLastShipoutHook\@undefined
90   \global\let\Call@AfterLastShipout\relax
91 }

```

\Call@AtVeryEndDocument

```

92 \newcommand*{\Call@AtVeryEndDocument}{%
93   \let\AtVeryEndDocument\@firstofone
94   \ifx\AtVeryEnd@AtVeryEndDocumentHook\@empty
95     \PackageInfo{atveryend}{Empty hook 'AtVeryEndDocument'}}%
96   \else
97     \PackageInfo{atveryend}{Executing hook 'AtVeryEndDocument'}}%
98     \AtVeryEnd@AtVeryEndDocumentHook
99   \fi
100   \global\let\AtVeryEnd@AtVeryEndDocumentHook\@undefined
101   \global\let\Call@AtVeryEndDocument\relax
102 }

```

\Call@AtEndAfterFileList

```

103 \newcommand*{\Call@AtEndAfterFileList}{%
104   \Call@AtVeryEndDocument
105   \let\AtEndAfterFileList\@firstofone
106   \ifx\AtVeryEnd@AtEndAfterFileListHook\@empty
107     \PackageInfo{atveryend}{Empty hook 'AtEndAfterFileList'}}%
108   \else
109     \PackageInfo{atveryend}{Executing hook 'AtEndAfterFileList'}}%
110     \AtVeryEnd@AtEndAfterFileListHook
111   \fi
112   \global\let\AtVeryEnd@AtEndAfterFileListHook\@undefined
113   \global\let\Call@AtEndAfterFileList\relax
114 }

```

\Call@AtVeryVeryEnd

```

115 \newcommand*{\Call@AtVeryVeryEnd}{%
116   \Call@AtEndAfterFileList
117   \let\AtVeryVeryEnd\@firstofone
118   \ifx\AtVeryEnd@AtVeryVeryEndHook\@empty
119     \PackageInfo{atveryend}{Empty hook 'AtVeryVeryEnd'}}%
120   \else
121     \PackageInfo{atveryend}{Executing hook 'AtVeryVeryEnd'}}%
122     \AtVeryEnd@AtVeryVeryEndHook
123   \fi
124   \global\let\AtVeryEnd@AtVeryVeryEndHook\@undefined
125   \global\let\Call@AtVeryVeryEnd\relax
126 }

```

## 2.2 Redefining \enddocument

This approach looks for known versions of \enddocument and redefines it. Class seminar and package slidesec are not checked, because there would be too much combinations to check.

### 2.2.1 L<sup>A</sup>T<sub>E</sub>X kernel

\AtVeryEnd@test@standard

```
127 \def\AtVeryEnd@test@standard{%
128   \let\AtEndDocument\@firstofone
129   \@enddocumenthook
130   \@checkend{document}%
131   \clearpage
132   \begingroup
133     \if@filesw
134       \immediate\closeout\@mainaux
135       \let\@setckpt\@gobbletwo
136       \let\@newl@bel\@testdef
137       \@tempswafalse
138       \makeatletter
139       \input\jobname.aux %
140     \fi
141     \@dofilelist
142     \ifdim \font@submax > \fontsubfuzz\relax
143       \@font@warning{Size substitutions with differences\MessageBreak
144         up to \font@submax\space have occurred.\@gobbletwo}%
145     \fi
146     \@defaultsubs
147     \@refundefined
148     \if@filesw
149       \ifx \@multiplelabels \relax
150         \if@tempswa
151           \@latex@warning@no@line{Label(s) may have changed. %
152             Rerun to get cross-references right}%
153         \fi
154       \else
155         \@multiplelabels
156       \fi
157     \fi
158   \endgroup
159   \deadcycles\z@
160   \@@end
161 }
```

tVeryEnd@enddocument@standard

```
162 \def\AtVeryEnd@enddocument@standard{%
163   \let\AtEndDocument\@firstofone
164   \@enddocumenthook
165   \@checkend{document}%
166   \Call@BeforeClearDocument
167   \clearpage
168   \Call@AfterLastShipout
169   \begingroup
170     \if@filesw
171       \immediate\closeout\@mainaux
172       \let\@setckpt\@gobbletwo
173       \let\@newl@bel\@testdef
174       \@tempswafalse
175       \makeatletter
176       \input\jobname.aux %
177     \fi
```

```

178 \Call@AtVeryEndDocument
179 \@dofilelist
180 \Call@AtEndAfterFileList
181 \ifdim \font@submax >\fontsubfuzz\relax
182 \font@warning{Size substitutions with differences\MessageBreak
183 up to \font@submax\space have occurred.\@gobbletwo}%
184 \fi
185 \@defaultsubs
186 \@refundefined
187 \if@files
188 \ifx \@multiplelabels \relax
189 \if@tempwa
190 \latex@warning@no@line{Label(s) may have changed. %
191 Rerun to get cross-references right}%
192 \fi
193 \else
194 \@multiplelabels
195 \fi
196 \fi
197 \endgroup
198 \deadcycles\z@
199 \Call@AtVeryVeryEnd
200 \@@end
201 }

```

### 2.2.2 Package `booklet`, file `2up.tex`

`\AtVeryEnd@test@booklet`

```

202 \expandafter\def\expandafter\AtVeryEnd@test@booklet\expandafter{%
203 \expandafter\twoupclearpage
204 \AtVeryEnd@test@standard
205 }

```

`\AtVeryEnd@enddocument@booklet`

```

206 \expandafter\def\expandafter\AtVeryEnd@enddocument@booklet\expandafter{%
207 \expandafter\twoclearpage
208 \AtVeryEnd@enddocument@standard
209 }

```

### 2.2.3 Class `dinbrief`

`\AtVeryEnd@test@dinbrief`

```

210 \def\AtVeryEnd@test@dinbrief{%
211 \@checkend{document} %
212 \newpage
213 \begingroup
214 \if@files
215 \ifnum\c@labelgen>0 %
216 \immediate\closeout\@mainlbl
217 \makeatletter
218 \input \jobname@lbl\relax
219 \clearpage
220 \fi
221 \immediate\closeout\@mainaux
222 \fi
223 \endgroup
224 \deadcycles\z@
225 \@@end
226 }

```

`\AtVeryEnd@enddocument@dinbrief`

```

227 \def\AtVeryEnd@enddocument@dinbrief{%
228   \@checkend{document}}%
229   \Call@BeforeClearDocument
230   \newpage
231   \Call@AfterLastShipout
232   \begingroup
233     \if@filesw
234       \ifnum\c@labelgen>\z@
235         \immediate\closeout\@mainlbl
236         \makeatletter
237         \input \jobname@lbl\relax
238         \clearpage
239       \fi
240       \immediate\closeout\@mainaux
241     \fi
242     \Call@AtVeryEndDocument
243     \csname @dofilelist\endcsname
244     \Call@AtEndAfterFileList
245   \endgroup
246   \deadcycles\z@
247   \Call@AtVeryVeryEnd
248   \@@end
249 }

```

#### 2.2.4 Class combine

\AtVeryEnd@test@combine

```

250 \def\AtVeryEnd@test@combine{%
251   \@enddocumenthook
252   \@checkend{document}}%
253   \clearpage
254   \begingroup
255     \if@filesw
256       \immediate\closeout\@mainaux
257       \immediate\closeout\@partaux
258       \let\@setckpt\@gobbletwo
259       \let\@newl@bel\@testdef
260       \@tempwafalse
261       \makeatletter \input\c@lmainauxfile %% change here
262     \fi
263     \c@lenddoca %% a replacement
264     \@refundefined
265   \endgroup
266   \deadcycles\z@
267   \@@end
268 }

```

AtVeryEnd@enddocument@combine

```

269 \def\AtVeryEnd@enddocument@combine{%
270   \@enddocumenthook
271   \@checkend{document}}%
272   \Call@BeforeClearDocument
273   \clearpage
274   \Call@AfterLastShipout
275   \begingroup
276     \if@filesw
277       \immediate\closeout\@mainaux
278       \immediate\closeout\@partaux
279       \let\@setckpt\@gobbletwo
280       \let\@newl@bel\@testdef
281       \@tempwafalse
282       \makeatletter \input\c@lmainauxfile %% change here

```



```

283 \fi
284 \Call@AtVeryEndDocument
285 \c@lenddoca %% a replacement
286 \@refundefined
287 \endgroup
288 \deadcycles\z@
289 \Call@AtVeryVeryEnd
290 \@@end
291 }

```

\AtVeryEnd@test@c@lenddoca

```

292 \long\def\AtVeryEnd@test@c@lenddoca{%
293 \do@filelist
294 \ifdim\font@submax>\fontsubfuzz\relax
295 \font@warning{%
296 Size substitutions with differences\MessageBreak
297 up to \font@submax\space have occurred.\@gobbletwo
298 }%
299 \fi
300 \@defaultsubs
301 \if@files
302 \ifx\@multiplelabels\relax
303 \if@tempwa
304 \latex@warning@no@line{%
305 Label(s) may have changed. %
306 Rerun to get cross-references right%
307 }%
308 \fi
309 \else
310 \@multiplelabels
311 \fi
312 \fi
313 }

```

\c@lenddoca

```

314 \ifx\AtVeryEnd@c@lenddoca\c@lenddoca
315 \def\c@lenddoca{%
316 \do@filelist
317 \Call@AtEndAfterFileList
318 \ifdim\font@submax>\fontsubfuzz\relax
319 \font@warning{%
320 Size substitutions with differences\MessageBreak
321 up to \font@submax\space have occurred.\@gobbletwo
322 }%
323 \fi
324 \@defaultsubs
325 \if@files
326 \ifx\@multiplelabels\relax
327 \if@tempwa
328 \latex@warning@no@line{%
329 Label(s) may have changed. %
330 Rerun to get cross-references right%
331 }%
332 \fi
333 \else
334 \@multiplelabels
335 \fi
336 \fi
337 }%
338 \fi

```

### 2.2.5 Class jpsj2

\AtVeryEnd@test@jpsj

```
339 \def\AtVeryEnd@test@jpsj{%
340   \if@lastpagebalancing
341     \global\let\@outputdblcol=\balancing@outputdblcol
342   \fi
343   \@checkend{document}%
344   \clearpage
345   \begingroup
346     \if@filesw
347       \immediate\closeout\@mainaux
348       \def\global\@namedef##1##2{%
349         \def\newlabel{\@testdef r}%
350         \def\bibcite{\@testdef b}%
351         \@tempswafalse
352         \makeatletter
353         \input \jobname.aux %
354         \if@tempswa
355           \@warning{%
356             Label(s) may have changed. %
357             Rerun to get cross-references right%
358           }%
359         \fi
360       \fi
361     \endgroup
362     \deadcycles\z@
363   \@@end
364 }
```

\AtVeryEnd@enddocument@jpsj

```
365 \def\AtVeryEnd@enddocument@jpsj{%
366   \if@lastpagebalancing
367     \global\let\@outputdblcol=\balancing@outputdblcol
368   \fi
369   \@checkend{document}%
370   \Call@BeforeClearDocument
371   \clearpage
372   \Call@AfterLastShipout
373   \begingroup
374     \if@filesw
375       \immediate\closeout\@mainaux
376       \def\global\@namedef##1##2{%
377         \def\newlabel{\@testdef r}%
378         \def\bibcite{\@testdef b}%
379         \@tempswafalse
380         \makeatletter
381         \input \jobname.aux %
382         \if@tempswa
383           \@warning{%
384             Label(s) may have changed. %
385             Rerun to get cross-references right%
386           }%
387         \fi
388       \fi
389     \Call@AtVeryEndDocument
390     \csname @dofilelist\endcsname
391     \Call@AtEndAfterFileList
392   \endgroup
393   \deadcycles\z@
394   \Call@AtVeryVeryEnd
395   \@@end
396 }
```

## 2.2.6 Testing and redefining

\AtVeryEnd@Test

```
397 \def\AtVeryEnd@Test#1#2{%
398   \expandafter\ifx\csname AtVeryEnd@test@#2\endcsname#1%
399     \expandafter\let\expandafter#1%
400     \csname AtVeryEnd@enddocument@#2\endcsname
401   \begingroup
402     \let\on@line\@empty
403     \PackageInfo{atveryend}{%
404       \string#1 detected (#2)%
405     }%
406   \endgroup
407   \expandafter\AtVeryEnd@SkipToNil
408 \fi
409 }
```

\AtVeryEnd@SkipToNil

```
410 \def\AtVeryEnd@SkipToNil#1\@nil{}
```

\AtVeryEnd@RedefEndDocument

```
411 \def\AtVeryEnd@RedefEndDocument#1{%
412   \ifx#1\@undefined
413   \else
414     \AtVeryEnd@Test#1{standard}%
415     \AtVeryEnd@Test#1{booklet}%
416     \AtVeryEnd@Test#1{dinbrief}%
417     \AtVeryEnd@Test#1{combine}%
418     \AtVeryEnd@Test#1{jpsj}%
419     \AtVeryEnd@SkipToNil
420   \@nil
421 \fi
422 }

423 \AtVeryEnd@RedefEndDocument\enddocument
424 \AtVeryEnd@RedefEndDocument\AP@enddocument % afterpage.sty
425 \AtVeryEnd@RedefEndDocument\hyper@back@cite@enddocument % htx-bc.sty
426 \AtVeryEnd@RedefEndDocument\hyper@enddocument % hyper.sty
427 \AtVeryEnd@RedefEndDocument\hyper@fn@enddocument % hyper.sty
428 \AtVeryEnd@RedefEndDocument\cweb@save@enddocument % cweb.cls
429 \AtVeryEnd@RedefEndDocument\prev@enddocument % flushend.sty
430 \AtVeryEnd@RedefEndDocument\endorigdocument % gaceta.cls
431 \AtVeryEnd@RedefEndDocument\keependdoc % aguplus.sty
432 \AtVeryEnd@RedefEndDocument\EMenddocument % t-angles.sty
433 \AtVeryEnd@RedefEndDocument\docmute@enddocument % docmute.sty
434 \AtVeryEnd@RedefEndDocument\@enddocument % alateX.sty
435 \AtVeryEnd@RedefEndDocument\enddocumentasusual % frenchle.sty
436 \AtVeryEnd@RedefEndDocument\old@enddocument % uwthesis.cls
```

## 2.3 Using hooks of other packages

### 2.3.1 Package scrfile

```
437 \AtBeginDocument{%
438   \@ifpackageloaded{scrfile}{%
439     \@ifundefined{BeforeClosingMainAux}{}{%
440       \BeforeClosingMainAux{\Call@AfterLastShipout}%
441     }%
442     \@ifundefined{AfterReadingMainAux}{}{%
443       \AfterReadingMainAux{\Call@AtVeryEndDocument}%
444     }%
445   }{}%
```

### 2.3.2 Package etoolbox

```
446 \ifpackageloaded{etoolbox}{%
447   \@ifundefined{AfterEndDocument}{}%
448   \AfterEndDocument{\Call@AtVeryEndDocument}%
449 }%
450 }
```

### 2.4 Hack into \enddocument

```
451 \def\AtVeryEnd@document{document}%
452 \def\AtVeryEnd@RedefCheckEnd{%
453   \expandafter\def\expandafter\@checkend
454   \expandafter##\expandafter1\expandafter{%
455     \@checkend{##1}%
456     \def\AtVeryEnd@temp{##1}%
457     \ifx\AtVeryEnd@temp\AtVeryEnd@document
458       \let\AtVeryEnd@OrgClearpage\clearpage
459       \def\clearpage{%
460         \let\clearpage\AtVeryEnd@OrgClearpage
461         \Call@BeforeClearDocument
462         \clearpage
463         \Call@AfterLastShipout
464       }%
465     \fi
466   }%
467   \aftergroup\AtVeryEnd@RedefCheckEnd
468 }%
469 \AtEndDocument{%
470   \AtVeryEnd@RedefCheckEnd
471 }%
472 }

473 \AtEndDocument{%
474   \@ifundefined{@dofilelist}{%
475     \gdef@dofilelist{%
476       \Call@AtVeryEndDocument
477       \Call@AtEndAfterFileList
478     }%
479   }%
480   \begingroup
481     \toks@\expandafter{\@dofilelist}%
482     \xdef@dofilelist{%
483       \noexpand\Call@AtVeryEndDocument
484       \the\toks@
485       \noexpand\Call@AtEndAfterFileList
486     }%
487   \endgroup
488 }%
489 }
```

### 2.5 Class letter

The class letter and some similar classes insert material (`\@startlabels`) at the end of the document. However, this method violates a precondition of this package that the `\clearpage` in `\enddocument` is the final call with no material at later times. Therefore we move the label making from the `.aux` file to `\AtEndDocument`.

```
490 \def\AtVeryEnd@temp{%
491   \AtBeginDocument{%
492     \let\@startlabels\startlabels
493     \let\@mlabel\mlabel
494     \if@filesw
495       \immediate\write\@mainaux{\string\@startlabels}%
496     \fi
497   }%
```

```

498 \AtEndDocument{%
499 \if@filesw
500 \immediate\write\@mainaux{\string\clearpage}%
501 \fi
502 }%
503 }
504 \ifx\makelabels\AtVeryEnd@temp
505 \else
506 \expandafter\AtVeryEnd@AtEnd
507 \fi%
508 \let\AtVeryEnd@PatchLetter=N%
509 \begingroup\expandafter\expandafter\expandafter\endgroup
510 \expandafter\ifx\csname endletter\endcsname\relax
511 \else
512 \long\def\AtVeryEnd@TestEndLetter#1\@auxout#2#3\AtVeryEnd@Nil{%
513 \def\AtVeryEnd@temp{#2}%
514 \ifx\AtVeryEnd@temp\@empty
515 \else
516 \@onelevel@sanitize\AtVeryEnd@temp
517 \edef\AtVeryEnd@StringMlabel{%
518 \string\string
519 \string\@mlabel
520 \expandafter\@gobble\string\{%
521 }%
522 \def\AtVeryEnd@CatchFirst##1##2##3##4##5##6##7##8{%
523 ##1##2##3##4##5##6##7##8\AtVeryEnd@CatchSecond
524 }%
525 \def\AtVeryEnd@CatchSecond##1##2##3##4##5##6##7##8##9\@nil{%
526 ##1##2##3##4##5##6##7##8%
527 }%
528 \edef\AtVeryEnd@temp{%
529 \expandafter\AtVeryEnd@CatchFirst\AtVeryEnd@temp
530 {}{}{}{}{}{}{}{}%
531 {}{}{}{}{}{}{}{}%
532 \@nil
533 }%
534 \ifx\AtVeryEnd@temp\AtVeryEnd@StringMlabel
535 \expandafter\def\expandafter\endletter\expandafter{%
536 \endletter
537 \begingroup
538 \let\=\relax
539 \let\protect\@unexpandable@protect
540 \let\@mlabel=\relax
541 \edef\x{\endgroup
542 \noexpand\AtEndDocument{%
543 \@gobble#2%
544 }%
545 }%
546 \x
547 }%
548 \let\AtVeryEnd@PatchLetter=Y%
549 \fi
550 \fi
551 }%
552 \expandafter\AtVeryEnd@TestEndLetter\endletter
553 \@auxout{}\AtVeryEnd@Nil
554 \fi
555 \ifx\AtVeryEnd@PatchLetter Y%
556 \begingroup
557 \let\on@line\@empty
558 \PackageInfo{atveryend}{%
559 \@backslashchar makelabels detected. %

```

```

560     Moving labels\MessageBreak
561     from '.aux' file to \@backslashchar AtEndDocument%
562 }%
563 \endgroup
564 \def\makelabels{%
565   \AtBeginDocument{%
566     \let\@startlabels\startlabels
567     \let\@mlabel\mlabel
568   }%
569 }%
570 \AtEndDocument{%
571   \@ifundefined{@startlabels}{%
572     }{%
573       \clearpage
574       \@startlabels
575     }%
576   }%
577   \AfterLastShipout{%
578     \let\@startlabels\relax
579     \let\@mlabel\@gobbletwo
580   }%
581 \else
582   \PackageWarningNoLine{atveryend}{%
583     \@backslashchar makelabels detected, but labels cannot\MessageBreak
584     be moved to \@backslashchar AtEndDocument, because\MessageBreak
585     \@backslashchar endletter is not in expected form%
586   }%
587 \fi
588 \AtVeryEnd@AtEnd%
589 </package>

```

## 3 Test

### 3.1 Catcode checks for loading

```

590 <*test1>
591 \catcode'\{=1 %
592 \catcode'\}=2 %
593 \catcode'\#=6 %
594 \catcode'\@=11 %
595 \expandafter\ifx\csname count@\endcsname\relax
596   \countdef\count@=255 %
597 \fi
598 \expandafter\ifx\csname @gobble\endcsname\relax
599   \long\def\@gobble#1{%
600 \fi
601 \expandafter\ifx\csname @firstofone\endcsname\relax
602   \long\def\@firstofone#1{#1}%
603 \fi
604 \expandafter\ifx\csname loop\endcsname\relax
605   \expandafter\@firstofone
606 \else
607   \expandafter\@gobble
608 \fi
609 {%
610   \def\loop#1\repeat{%
611     \def\body{#1}%
612     \iterate
613   }%
614   \def\iterate{%
615     \body

```

```

616     \let\next\iterate
617     \else
618     \let\next\relax
619     \fi
620     \next
621 }%
622 \let\repeat=\fi
623 }%
624 \def\RestoreCatcodes{%
625 \count@=0 %
626 \loop
627   \edef\RestoreCatcodes{%
628     \RestoreCatcodes
629     \catcode\the\count@=\the\catcode\count@\relax
630   }%
631 \ifnum\count@<255 %
632   \advance\count@ 1 %
633 \repeat
634
635 \def\RangeCatcodeInvalid#1#2{%
636   \count@=#1\relax
637   \loop
638     \catcode\count@=15 %
639   \ifnum\count@<#2\relax
640     \advance\count@ 1 %
641   \repeat
642 }
643 \def\RangeCatcodeCheck#1#2#3{%
644   \count@=#1\relax
645   \loop
646     \ifnum#3=\catcode\count@
647     \else
648       \errmessage{%
649         Character \the\count@\space
650         with wrong catcode \the\catcode\count@\space
651         instead of \number#3%
652       }%
653     \fi
654   \ifnum\count@<#2\relax
655     \advance\count@ 1 %
656   \repeat
657 }
658 \def\space{ }
659 \expandafter\ifx\csname LoadCommand\endcsname\relax
660   \def\LoadCommand{\input atveryend.sty\relax}%
661 \fi
662 \def\Test{%
663   \RangeCatcodeInvalid{0}{47}%
664   \RangeCatcodeInvalid{58}{64}%
665   \RangeCatcodeInvalid{91}{96}%
666   \RangeCatcodeInvalid{123}{255}%
667   \catcode'\@=12 %
668   \catcode'\=0 %
669   \catcode'\%=14 %
670   \LoadCommand
671   \RangeCatcodeCheck{0}{36}{15}%
672   \RangeCatcodeCheck{37}{37}{14}%
673   \RangeCatcodeCheck{38}{47}{15}%
674   \RangeCatcodeCheck{48}{57}{12}%
675   \RangeCatcodeCheck{58}{63}{15}%
676   \RangeCatcodeCheck{64}{64}{12}%
677   \RangeCatcodeCheck{65}{90}{11}%

```

```

678 \RangeCatcodeCheck{91}{91}{15}%
679 \RangeCatcodeCheck{92}{92}{0}%
680 \RangeCatcodeCheck{93}{96}{15}%
681 \RangeCatcodeCheck{97}{122}{11}%
682 \RangeCatcodeCheck{123}{255}{15}%
683 \RestoreCatcodes
684 }
685 \Test
686 \csname @@end\endcsname
687 \end
688 </test1>

```

## 4 Installation

### 4.1 Download

**Package.** This package is available on CTAN<sup>1</sup>:

[CTAN:macros/latex/contrib/oberdiek/atveryend.dtx](#) The source file.

[CTAN:macros/latex/contrib/oberdiek/atveryend.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 T<sub>E</sub>X Files” ([CTAN:tds/tds.pdf](#)). Directories with `texmf` in their name are usually organized this way.

### 4.2 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
```

**Script installation.** Check the directory `TDS:scripts/oberdiek/` for scripts that need further installation steps. Package `attachfile2` comes with the Perl script `pdfatfi.pl` that should be installed in such a way that it can be called as `pdfatfi`. Example (linux):

```

chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/

```

### 4.3 Package installation

**Unpacking.** The `.dtx` file is a self-extracting `docstrip` archive. The files are extracted by running the `.dtx` through plain T<sub>E</sub>X:

```
tex atveryend.dtx
```

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

```

atveryend.sty      → tex/latex/oberdiek/atveryend.sty
atveryend.pdf      → doc/latex/oberdiek/atveryend.pdf
test/atveryend-test1.tex → doc/latex/oberdiek/test/atveryend-test1.tex
atveryend.dtx      → source/latex/oberdiek/atveryend.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`.

<sup>1</sup><http://ftp.ctan.org/tex-archive/>



## 4.4 Refresh file name databases

If your  $\text{T}_{\text{E}}\text{X}$  distribution (te $\text{T}_{\text{E}}\text{X}$ , mi $\text{T}_{\text{E}}\text{X}$ , ...) relies on file name databases, you must refresh these. For example, te $\text{T}_{\text{E}}\text{X}$  users run `texhash` or `mktextlsr`.

## 4.5 Some details for the interested

**Attached source.** The PDF documentation on CTAN also includes the `.dtx` source file. It can be extracted by AcrobatReader 6 or higher. Another option is `pdftk`, e.g. unpack the file into the current directory:

```
pdftk atveryend.pdf unpack_files output .
```

**Unpacking with  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ .** The `.dtx` chooses its action depending on the format:

**plain  $\text{T}_{\text{E}}\text{X}$ :** Run `docstrip` and extract the files.

**$\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ :** Generate the documentation.

If you insist on using  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$  for `docstrip` (really, `docstrip` does not need  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ ), then inform the autodetect routine about your intention:

```
latex \let\install=y\input{atveryend.dtx}
```

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

**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 pdf $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ :

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

## 5 Acknowledgement

**Arthur Ogawa:** He proposed the new API with `\AfterLastShipout` and gave me much feedback, comprehensive class/package lists, many suggestions and comments.

## 6 References

- [1] The  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}3$  Project:  *$\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}2\epsilon$  for class and package writers* 2006/02/15; [CTAN:macros/latex/doc/clsguide.pdf](#).
- [2] James Darrell McCauley, Jeff Goldberg: *The endfloat package*; 1995/10/11 v2.4i; [CTAN:macros/latex/contrib/endfloat/endfloat.pdf](#).
- [3] Philipp Lehmann: *The etoolbox package*; 2009/08/06 v1.8; [CTAN:macros/latex/contrib/etoolbox/etoolbox.pdf](#).
- [4] Sebastian Rahtz, Heiko Oberdiek: *The hyperref package*; 2009/12/05 v6.79l; [CTAN:macros/latex/contrib/hyperref/](#).

- [5] Markus Kohm: *KOMA-Script*; 2009/07/24 v3.04a; <http://www.komascript.de/>.
- [6] Jeff Goldberg: *The lastpage package*; 1994/07/20 v0.1b; [CTAN:macros/latex/contrib/lastpage/lastpage.pdf](http://CTAN:macros/latex/contrib/lastpage/lastpage.pdf).
- [7] APS, AIP, Arthur Orgawa; ReVTeX 4.1; 2009/10/13 v4.1; <http://authors.aps.org/revtex4/>.

## 7 History

**[2009/12/06 v1.0]**

- The first version.

**[2009/12/07 v1.1]**

- Bug fixes.

**[2009/12/09 v1.2]**

- Additional support of classes and packages.

**[2009/12/11 v1.3]**

- Patch for letter like classes that puts label into the ‘.aux’ file.
- Hook `\BeforeClearDocument` added (request from Arthur Ogawa).
- Patch of `\clear@document` removed (Arthur Ogawa).
- A nested `\AtBeginDocument` removed.

**[2010/01/25 v1.4]**

- Moved from TDS:\*/generic/\* to TDS:\*/latex/.

**[2010/03/24 v1.5]**

- `\Call@BeforeClearDocument` fixed (Ahmed Musa).

**[2011/04/15 v1.6]**

- `\Call@AtEndAfterFileList` and `\Call@AtVeryVeryEnd` added.

## 8 Index

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