

The latex-lab-titlesec package

Emulating titlesec

L^AT_EX Project*

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Abstract

The titlesec package is incompatible with the new tagging code and if it is used together with `\DocumentMetadata` (with or without tagging turned on) it will generate a number of warnings followed by package errors—in other words the combination is not usable.

The following code implements an emulation of titlesec usable with the tagging support code. For now only some of the package interfaces are supported and all others will bail out with a suitable error message.

If `\DocumentMetadata` is used and titlesec is requested then the emulation is loaded instead. As long as the emulation is still being worked on the emulation is also available under the name latex-lab-titlesec.

1 Introduction

The titlesec package offers customizable heading commands but is not compatible with the tagging support code where headings are reimplemented with templates.

The following code partly emulates titlesec; missing functionality will be added near future.

2 Package options

The titlesec package has a number of package options that implement basic layout choices across all headings. They are listed in table 1. A few are no longer relevant as the functionality is already available in core L^AT_EX. The others are emulated.

Table 1: List of titlesec package options

titlesec option	supported	comments
<code>rm</code>	yes	
<code>sf</code>	yes	
<code>tt</code>	yes	
<code>md</code>	yes	
<code>bf</code>	yes	
<code>up</code>	yes	

*Initial implementation done by Frank Mittelbach

Table 1: List of titlesec package options

titlesec option	supported	comments
<code>it</code>	yes	
<code>sl</code>	yes	
<code>sc</code>	yes	
<code>big</code>	yes	
<code>medium</code>	yes	
<code>small</code>	yes	
<code>tiny</code>	yes	
<code>raggedleft</code>	yes	
<code>center</code>	yes	
<code>raggedright</code>	yes	
<code>compact</code>	yes	
<code>uppercase</code>	yes	
<code>indentafter</code>	yes	relationship with <code>\titlespacing</code> needs verification
<code>noindentafter</code>	yes	
<code>rigidchapters</code>		needs extra support in all templates first L ^A T _E X's default
<code>rubberchapters</code>	yes	
<code>bottomtitles</code>	yes	
<code>nobottomtitles</code>		needs extra support in all templates first
<code>nobottomtitles*</code>		needs extra support in all templates first
<code>innermarks</code>	yes	
<code>outermarks</code>		needs extra support in all templates first
<code>topmarks</code>		needs extra support in all templates first
<code>extramarks</code>	n/a	L ^A T _E X's mark mechanism offers this directly
<code>nopatches</code>	n/a	no longer useful; silently accepted
<code>aftersep</code>	yes	default behavior
<code>largestsep</code>		needs extra support in <code>_sec_vertical_before_spacing:</code>
<code>pageatnewline</code>	no	strange legacy option, ignored
<code>nostruts</code>		needs extra support in all templates first
<code>calwidth</code>		needs extra support in all templates first
<code>explicit</code>		to be implemented as part of <code>\titleformat</code>
<code>newparttoc</code>	n/a	default behavior, silently accepted
<code>oldparttoc</code>	no	ignored with a warning
<code>cleareempty</code>	yes	
<code>toctitles</code>	yes	
<code>notocpart*</code>	n/a	automatically applied; mechanism is different these days
<code>loadonly</code>	n/a	no longer useful; silently accepted

3 Commands

The list of support commands offered by `titlesec` is given in table 2. We expect to emulate all of them eventually.

Table 2: List of titlesec user commands

name	emulated	comment
<code>\titlelabel</code>		
<code>\titleformat</code>		
<code>\titleformat*</code>		
<code>\chaptertitlename</code>	yes	
<code>\titlespacing</code>		
<code>\titlespacing*</code>		
<code>\filright</code>	yes	use cases need checking
<code>\filcenter</code>	yes	use cases need checking
<code>\filleft</code>	yes	use cases need checking
<code>\fillast</code>	yes	use cases need checking
<code>\filinner</code>	yes	use cases need checking
<code>\filouter</code>	yes	use cases need checking
<code>\wordsep</code>	yes	
<code>\bottomtitlespace</code>	yes	but not yet used
<code>\nostruts</code>		
<code>\titleline</code>		
<code>\titlerule</code>		
<code>\titlerule*</code>		
<code>\iftitlemeasuring</code>		
<code>\titleline*</code>		

4 Implementation

```

1 <*package>

2 \ProvidesExplPackage {latex-lab-titlesec} {\ltitlesecdate}
3                      {\ltitlesecversion}
4                      {Emulating titlesec}

```

4.1 Package options

```

5 <@@=ttl>

```

4.1.1 Options for font family, series, and shape

`\l__ttl_fonts_tl` Font options are collected in `\l__ttl_fonts_tl` which is then used in the `heading-decls`.

```

6 \tl_new:N \l__ttl_fonts_tl
7
8 (End of definition for \l__ttl_fonts_tl.)
9
10 \DeclareOption{rm}{
11   \tl_put_right:Nn \l__ttl_fonts_tl {\rmfamily} }
12 \DeclareOption{sf}{
13   \tl_put_right:Nn \l__ttl_fonts_tl {\sffamily} }
14 \DeclareOption{tt}{
15   \tl_put_right:Nn \l__ttl_fonts_tl {\ttfamily} }
16 \DeclareOption{md}{

```

```

14 \tl_put_right:Nn \l__ttl_fonts_tl {\mdseries} }
15 \DeclareOption{bf}{
16 \tl_put_right:Nn \l__ttl_fonts_tl {\bfseries} }
17 \DeclareOption{up}{
18 \tl_put_right:Nn \l__ttl_fonts_tl {\upshape} }
19 \DeclareOption{it}{
20 \tl_put_right:Nn \l__ttl_fonts_tl {\itshape} }
21 \DeclareOption{sl}{
22 \tl_put_right:Nn \l__ttl_fonts_tl {\slshape} }
23 \DeclareOption{sc}{
24 \tl_put_right:Nn \l__ttl_fonts_tl {\scshape} }

```

4.1.2 Option for font sizes

`\ttl@sizes` Macro that holds the font sizes for different heading levels. We keep the original L^AT_EX 2_ε name as used in the package just in case somebody has redefined that macro in a document preamble (or in a class file after loading titlesec).

```

25 \cs_new_protected:Npn \ttl@sizes #1 {
26 \ifcase#1\relax\Huge\or\Large\or\large
27 \or\normalsize\or\or\or\huge\fi
28 }

```

(End of definition for \ttl@sizes.)

The package options then redefine the list.

```

29 \DeclareOption{big}{
30 \cs_set_protected:Npn \ttl@sizes #1
31 {\ifcase#1\relax\Huge\or\Large\or\large
32 \or\normalsize\or\or\or\huge\fi}}
33 \DeclareOption{medium}{
34 \cs_set_protected:Npn \ttl@sizes #1
35 {\ifcase#1\relax\huge\or\Large\or\large
36 \or\normalsize\or\or\or\LARGE\fi}}
37 \DeclareOption{small}{
38 \cs_set_protected:Npn \ttl@sizes #1
39 {\ifcase#1\relax\LARGE\or\large
40 \or\normalsize\or\normalsize\or\or\or\Large\fi}}
41 \DeclareOption{tiny}{
42 \cs_set_protected:Npn \ttl@sizes #1
43 {\ifcase#1\relax\large\or\normalsize\or
44 \normalsize\or\normalsize\or\or\or\normalsize\fi}}

```

4.1.3 Option compact

`\g__ttl_compact_bool` Boolean to indicate that the compact option was used.

```

45 \bool_new:N \g__ttl_compact_bool

```

(End of definition for \g__ttl_compact_bool.)

```

46 \DeclareOption{compact}{\bool_gset_true:N \g__ttl_compact_bool }

```

4.1.4 Option uppercase

`\__ttl_case:n` Unprotected macro to be used in key values. There we expand and thus get the value inside.

```
47 \cs_new_eq:NN \__ttl_case:n \use:n
```

(End of definition for __ttl_case:n.)

Using `\cs_set:Npn` instead of `\cs_set_eq:NN` below allows us to get `\MakeUppercase` into the key values below through a one-level expansion.

```
48 \DeclareOption{uppercase}{ \cs_set:Npn \__ttl_case:n #1 { \MakeUppercase {#1} } }
```

4.1.5 Options for shifting text

`\__ttl_fil:` Unprotected macro to be used in key values. There we expand and thus get the value inside.

```
49 \cs_new:Npn \__ttl_fil: {}
```

(End of definition for __ttl_fil:.)

```
50 \DeclareOption{raggedleft} { \cs_set:Npn \__ttl_fil: { \filleft} }
51 \DeclareOption{center}     { \cs_set:Npn \__ttl_fil: { \filcenter} }
52 \DeclareOption{raggedright}{ \cs_set:Npn \__ttl_fil: { \filright} }
```

4.1.6 Options for indentation after a display header

`\l__ttl_indentafter_tl`

```
53 \tl_new:N \l__ttl_indentafter_tl
54 \tl_set:Nn \l__ttl_indentafter_tl {false}
```

(End of definition for \l__ttl_indentafter_tl.)

```
55 \DeclareOption{indentafter}{
56   \tl_set:Nn \l__ttl_indentafter_tl {true}
57   % \gdef\@afterindentfalse{\let\if@afterindent\iftrue}%
58   % \@afterindenttrue
59   % \def\titlespacing{%
60     %   \@ifstar{\ttl@spacing@i{\@ne}}{\ttl@spacing@i{\@ne}}}
61 }
62 \DeclareOption{noindentafter}{
63   \tl_set:Nn \l__ttl_indentafter_tl {false}
64   % \def\titlespacing{%
65     %   \@ifstar{\ttl@spacing@i{\z@}}{\ttl@spacing@i{\z@}}}
66 }
```

4.1.7 Options that are no longer useful

```
67 \DeclareOption{pageatnewline}
68   {\PackageWarning{titlesec~ emulation}{Option~ 'pageatnewline'~ ignored}}

69 \DeclareOption{oldparttoc}
70   {\PackageWarning{titlesec~ emulation}{Option~ 'oldparttoc'~ ignored}}

71 \DeclareOption{extramarks}
72   {\PackageWarning{titlesec~ emulation}{Option~ 'extramarks'~ ignored}}
```

```

73 \DeclareOption{newparttoc}
74   {\PackageInfo{titlesec~ emulation}{Option~ 'newparttoc'~ is~ the~ default}}

75 \DeclareOption{notocpart*}
76   {\PackageInfo{titlesec~ emulation}{Option~ 'notocpart*'~ is~ the~ default}}

77 \DeclareOption{loadonly}
78   {\PackageInfo{titlesec~ emulation}{Option~ 'loadonly'~ no~ longer~ applicable}}

```

4.1.8 Option cleareempty

```

79 \DeclareOption{cleareempty}{
80   \def\cleardoublepage{
81     \clearpage{\ps@empty\if@twoside\ifodd\c@page\else
82       \hbox{} \newpage\if@twocolumn\hbox{} \newpage\fi\fi\fi}}

```

4.1.9 Spacing between conscutive headings

TODO: The option `largestsep` needs support in latex-lab-sec-template.

```

83 \DeclareOption{aftersep}{
84   \let\ttl@titlespace@gobble}
85 \DeclareOption{largestsep}{
86   \let\ttl@titlespace@addvspace}

```

4.1.10 Option toctitles

```

87 \DeclareOption{toctitles} {
88   \keys_define:nn {heading}
89     { shorttitle .meta:n =
90       { running = {#1} , bookmark = {#1} , nameref= {#1} }
91     }
92 }

```

4.1.11 Options for setting marks

In modern L^AT_EX kernels, the core team introduced the new native marks mechanism (l^AT_EX marks). This system native to the core eliminates the need for titles or extramarks hacky workarounds by natively tracking independent mark classes (such as columns vs. pages) and fixing long-standing bugs where LaTeX floats could corrupt `\topmark`.

When you use standard sectioning commands, modern LaTeX automatically populates two core internal mark classes:

2e-left (controlled legacy-wise via `\leftmark`, historically mapped to the higher-level section, like Chapter)

2e-right (controlled legacy-wise via `\rightmark`, historically mapped to the lower-level section, like Section)

The standard modern commands to query these are `\TopMark`, `\FirstMark`, and `\LastMark`.

Here is how you can directly implement the titlesec/titles behaviors (innermarks, outermarks, topmarks, and botmarks) using pure modern LaTeX interfaces (for instance, inside a header-management package like fancyhdr or standard page styles).

Replicating innermarks (The Standard Default) `innermarks` uses the first section appearing on odd pages and the last section on even pages.

- Even Page Layout (Left): Prints the last mark bound to the current page (`\LastMark`).
- Odd Page Layout (Right): Prints the first mark appearing on the page (`\FirstMark`).

```
\usepackage{fancyhdr}
\pagestyle{fancy}
\fancyhf{}

% Even (Left) Pages: use the last top-level section
%   (e.g. Chapter) on this page
\fancyhead[EL]{\TopMark{2e-left}}
\fancyhead[ER]{\LastMark{2e-right}} % Last sub-level section
                                     % on even page

% Odd (Right) Pages: use the first sub-level section
%   (e.g. Section) starting on this page
\fancyhead[OL]{\FirstMark{2e-right}}
\fancyhead[OR]{\thepage}
```

Replicating outermarks (The Textbook Classic) `outermarks` flips the behavior, making even pages show the section that was active at the very top of the page, and odd pages show the final section.

- Even Page Layout (Left): Prints the top mark inherited from the previous page's state (`\TopMark`).
- Odd Page Layout (Right): Prints the last mark on the page (`\LastMark`).

```
% Even Pages: Show the section title current at the VERY TOP of the page
\fancyhead[EL]{\TopMark{2e-left}}
\fancyhead[ER]{\TopMark{2e-right}}

% Odd Pages: Show the LAST section title appearing on this page
\fancyhead[OL]{\LastMark{2e-right}}
\fancyhead[OR]{\thepage}
```

Replicating topmarks (Top-of-Page Anchored) The `topmarks` configuration ensures both even and odd pages emphasize what content is current at the immediate top of the page boundary when it gets rendered.

```
% Both pages show exactly what section is current when
% the page text begins
\fancyhead[EL]{\TopMark{2e-left}}
\fancyhead[OR]{\TopMark{2e-right}}
```

Replicating botmarks (Bottom-of-Page Anchored) The botmarks option forces headers to reflect the final state of section headers reached before the page breaks.

% Both pages show the last updated section content from that specific page
`\fancyhead[EL]{\LastMark{2e-left}}`
`\fancyhead[OR]{\LastMark{2e-right}}`

TODO: not handled yet; has to wait for support in templates.

```
93 \DeclareOption{outermarks}{
94   \def\ttl@titlemarks{\outertitlemarks}}
95 \DeclareOption{topmarks}{
96   \def\ttl@titlemarks{\toptitlemarks}}
97 \DeclareOption{botmarks}{
98   \def\ttl@titlemarks{\bottitlemarks}}
99 \DeclareOption{innermarks}{
100   \def\ttl@titlemarks{\innertitlemarks}}
101 \DeclareOption{nopatches}{\let\ttl@atbegin\relax}
```

Not yet emulated ...

```
102 \DeclareOption{bottomtitles}{%
103   \def\bottomtitlespace{-1\p@}}
104 \DeclareOption{nobottomtitles}{%
105   \def\bottomtitlespace{.2\textheight}}
106 \DeclareOption{nobottomtitles*}{%
107   \let\ttl@addstretch\relax
108   \def\bottomtitlespace{.2\textheight}}
```

4.2 Option execution and final adjustments

```
109 \ExecuteOptions{
110   % rubberchapters,
111   bottomtitles,      % this defines \bottomtitlespace
112   % aftersep,
113   % oldparttoc,
114   % innermarks
115 }
```

```
116 \ProcessOptions
```

If no font options used we apply `\bfseries` as the default for all headings:

```
117 \tl_if_empty:NT \l__ttl_fonts_tl { \tl_set:Nn \l__ttl_fonts_tl {\bfseries} }
```

`\beforetitleunit` Two skips that are used if the compact option is used.

```
\aftertitleunit
118 \skip_new:N \beforetitleunit
119 \skip_new:N \aftertitleunit
```

```
120 \skip_set:Nn \beforetitleunit {1ex plus .3ex minus .06ex}
121 \skip_set:Nn \aftertitleunit {1ex plus .1ex}
```

(End of definition for `\beforetitleunit` and `\aftertitleunit`.)

4.3 Command emulation

`\chaptertitlename`

```
122 \cs_new_protected:Npn \chaptertitlename { \@chapapp }
(End of definition for \chaptertitlename.)
```

`\wordsep`

```
123 \cs_new_protected:Npn \wordsep {\fontdimen\tw@\font \@plus
124 \fontdimen\thr\_ttl\font \@minus \fontdimen4\font}
(End of definition for \wordsep.)
```

`\filcenter`

`\filright`

`\filleft`

```
125 \cs_new_protected:Npn \filcenter { \centering }
126 \cs_new_protected:Npn \filright { \raggedright }
127 \cs_new_protected:Npn \filleft { \raggedleft }
```

(End of definition for `\filcenter`, `\filright`, and `\filleft`.)

`\filinner`

`\filouter`

These two commands are incorrectly implemented in `titlesec` and can produce wrong results. We can do better.

We want those to expand to the next level so no protection.

```
128 \cs_new:Npn \filinner { \IfVersoHeadingTF \filright \filleft }
129 \cs_new:Npn \filouter { \IfVersoHeadingTF \filleft \filright }
```

(End of definition for `\filinner` and `\filouter`.)

`\titleformat`

The `\titleformat` declaration has the following syntax:

```
\titleformat{cmd}[shape]{format}{label}{sep}{before-code}[after-code]
```

`\titlespacing`

The `\titlespacing` declaration has the following syntax:

```
\titlespacing*{cmd}{left-sep}{before-vspace}{after-vspace}[right-sep]
```

All commands that do not have an emulation yet simply raise an error (we try to pick up the arguments that follow but that may not always work).

```
130 \newcommand\csnotyetprovided[1]{
131 \PackageError{titlesec~ emulation}{Command~ \noexpand#1 not~ yet~ emulated}
132 {The~ titlesec~ emulation~ is~ not~ yet~ complete~ and~ this~
133 command~ can't
134 \MessageBreak
135 be~ used~ in~ documents~ using~ \string\DocumentMetadata.~ \@eha}
136 }

137 \DeclareDocumentCommand\titleformat {smommmmo}{ \csnotyetprovided \titleformat }
138 \DeclareDocumentCommand\titlespacing{smmmmo} { \csnotyetprovided \titlespacing }
139 \DeclareDocumentCommand\titlelabel {som} { \csnotyetprovided \titlelabel }
140 \DeclareDocumentCommand\nostruts {} { \csnotyetprovided \nostruts }
141 \DeclareDocumentCommand\titleline {som} { \csnotyetprovided \titleline }

142 \DeclareDocumentCommand\titlerule{so}
143 { \IfBooleanTF #1 \titleruleleaders \titlerulenormal }
144 \DeclareDocumentCommand\titleruleleaders{m} { \csnotyetprovided \titlerule }
145 \DeclareDocumentCommand\titlerulenormal {} { \csnotyetprovided \titlerule }

146 \newcommand \iftitlemeasuring { \csnotyetprovided \iftitlemeasuring \@secondoftwo }
```

4.4 Instance adjustments based on options

```

147 \IfInstanceExistsT{heading}{chapter}{
148   \EditInstance{heading}{chapter}    {

```

We expand as much as reasonably possible to make the key values look nice in `\ShowInstanceValues`, e.g., instead of `\l__ttl_fonts_tl` we then get something like `\sffamily\bfseries`.

```

149     heading-decls:e = \exp_not:o \l__ttl_fonts_tl
150                     \exp_not:n {\setlength\parindent{0pt}}
151                     \__ttl_fil:
152                     \exp_not:N \ttl@sizes{6}
153   , title-decls     = \ttl@sizes{0} ,
154   , title-format:o  = \__ttl_case:n {#1}
155   , para-indent:o   = \l__ttl_indentafter_tl
156 }
157 \EditInstance{headformat}{chapter} {
158   separator-b = \par \nobreak \vspace {.8\baselineskip}
159 }
160 }

161 \EditInstance{heading}{section}
162 {
163   heading-decls:e = \exp_not:o \l__ttl_fonts_tl
164                   \__ttl_fil:
165                   \exp_not:N \ttl@sizes{1}
166   , title-format:o = \__ttl_case:n {#1}
167   , para-indent:o  = \l__ttl_indentafter_tl
168 }
169 \EditInstance{heading}{subsection}
170 {
171   heading-decls:e = \exp_not:o \l__ttl_fonts_tl
172                   \__ttl_fil:
173                   \exp_not:N \ttl@sizes{2}
174   , title-format:o = \__ttl_case:n {#1}
175   , para-indent:o  = \l__ttl_indentafter_tl
176 }
177 \EditInstance{heading}{subsubsection}
178 {
179   heading-decls:e = \exp_not:o \l__ttl_fonts_tl
180                   \__ttl_fil:
181                   \exp_not:N \ttl@sizes{3}
182   , title-format:o = \__ttl_case:n {#1}
183   , para-indent:o  = \l__ttl_indentafter_tl
184 }
185 \EditInstance{heading}{paragraph}
186 {
187   heading-decls:e = \exp_not:o \l__ttl_fonts_tl
188                   \exp_not:N
189                   \ttl@sizes{4}
190   , title-format:o = \__ttl_case:n {#1}
191 }
192 \EditInstance{heading}{subparagraph}
193 {
194   heading-decls:e = \exp_not:o \l__ttl_fonts_tl

```

```

195         \exp_not:N \ttl@sizes{5}
196     , title-format:o = \__ttl_case:n {#1}
197 }

```

We do the setting for option compact separately:

```

198 \bool_if:NT \g__ttl_compact_bool {
199     \IfInstanceExistsT{heading}{chapter}{
200         \EditInstance{heading}{chapter} { after-vspace = 30pt }
201     }
202     \EditInstance{heading}{section}
203         { before-vspace = \beforetitleunit , after-vspace = \aftertitleunit }
204     \EditInstance{heading}{subsection}
205         { before-vspace = \beforetitleunit , after-vspace = \aftertitleunit }
206     \EditInstance{heading}{subsubsection}
207         { before-vspace = \beforetitleunit , after-vspace = \aftertitleunit }
208     \EditInstance{heading}{paragraph} { before-vspace = \beforetitleunit }
209     \EditInstance{heading}{subparagraph} { before-vspace = \beforetitleunit }
210 }
211
212 \end{package}

```