

# The `environmentoptional` package<sup>\*</sup>

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## 1 Introduction

The `environmentoptional` package provides an alternative to L<sup>A</sup>T<sub>E</sub>X's standard `\newenvironment` command, allowing you to define environments with a variable number of optional and mandatory arguments.

## 2 Usage

`\newenvironmentoptionals` The primary command is `\newenvironmentoptionals`:

```
\newenvironmentoptionals{\langle name \rangle}[\langle n_opt \rangle][\langle n_mand \rangle]{\begin{ code}}{\end code}
```

where  $\langle n_{opt} \rangle$  is the number of optional arguments and  $\langle n_{mand} \rangle$  the number of mandatory arguments.

`\beginoptionals` To use such an environment, use:

```
\beginoptionals{\langle name \rangle}[\langle opt1 \rangle]...{\langle mand1 \rangle}...
```

`\endoptionals` And close it with:

```
\endoptionals{\langle name \rangle}
```

## 3 Implementation

```
1 \RequirePackage{xparse}
2
3 \ExplSyntaxOn
4
5 % --- Global Metadata Storage ---
6 \prop_new:N \g__envopt_metadata_prop
7
8 % --- Variables ---
```

---

<sup>\*</sup>This document corresponds to `environmentoptional` v1.14, dated 2026/02/13.

```

9 \int_new:N \l__envopt_opt_count_int
10 \int_new:N \l__envopt_mand_count_int
11 \int_new:N \l__envopt_total_count_int
12 \tl_new:N \l__envopt_name_tl
13 \tl_new:N \l__envopt_arg_spec_tl
14 \tl_new:N \l__envopt_m_spec_tl
15 \tl_new:N \l__envopt_exec_tl
16 \tl_new:N \l__envopt_begin_code_tl
17 \tl_new:N \l__envopt_end_code_tl
18
19 \seq_new:N \l__envopt_def_vals_seq
20 \seq_new:N \l__envopt_values_seq
21
22 % --- Error messages ---
23 \msg_new:nnn { environmentoptional } { name-mismatch }
24 {
25   Environment~name~mismatch.~Expected~'#1',~but~got~'#2'~in~\token_to_str:N \endoptionals.
26 }
27
28 \msg_new:nnn { environmentoptional } { too-many-args }
29 {
30   The~sum~of~optional~(#1)~and~mandatory~(#2)~arguments~must~be~maximum~9.
31 }
32
33 % --- \newenvironmentoptionals Implementation ---
34
35 \NewDocumentCommand{\newenvironmentoptionals}{ m 0{0} 0{0} }
36 {
37   \tl_set:Nn \l__envopt_name_tl { #1 }
38   \int_set:Nn \l__envopt_opt_count_int { #2 }
39   \int_set:Nn \l__envopt_mand_count_int { #3 }
40   \int_set:Nn \l__envopt_total_count_int { #2 + #3 }
41
42   \int_compare:nNnTF { \l__envopt_total_count_int } > { 9 }
43   {
44     \msg_error:nnnx { environmentoptional } { too-many-args }
45     { \int_use:N \l__envopt_opt_count_int }
46     { \int_use:N \l__envopt_mand_count_int }
47   }
48   {
49     \prop_gput:Nnn \g__envopt_metadata_prop { #1 } { #2 : #3 }
50     \seq_clear:N \l__envopt_def_vals_seq
51     \__envopt_scan_opt_defaults:n { #2 }
52   }
53 }
54
55 \cs_new_protected_nopar:Npn \__envopt_scan_opt_defaults:n #1
56 {
57   \int_compare:nNnTF { #1 } > { 0 }
58   {

```

```

59 \peek_meaning_ignore_spaces:NTF [
60   { \__envopt_grab_opt_default:n { #1 } }
61   {
62     \seq_put_right:Nn \l__envopt_def_vals_seq { }
63     \__envopt_scan_opt_defaults:n { \int_eval:n { #1 - 1 } }
64   }
65 }
66 {
67   \__envopt_read_env_code:w
68 }
69 }
70
71 \NewDocumentCommand{ \__envopt_grab_opt_default:n } { m r[] }
72 {
73   \seq_put_right:Nn \l__envopt_def_vals_seq { #2 }
74   \__envopt_scan_opt_defaults:n { \int_eval:n { #1 - 1 } }
75 }
76
77 \NewDocumentCommand{ \__envopt_read_env_code:w } { +m +m }
78 {
79   \tl_set:Nn \l__envopt_begin_code_tl { #1 }
80   \tl_set:Nn \l__envopt_end_code_tl { #2 }
81   \__envopt_define_all:
82 }
83
84 \cs_new_protected_nopar:Npn \__envopt_define_all:
85 {
86   \tl_clear:N \l__envopt_arg_spec_tl
87   \tl_clear:N \l__envopt_m_spec_tl
88
89   \seq_map_inline:Nn \l__envopt_def_vals_seq
90   {
91     \tl_put_right:Nn \l__envopt_arg_spec_tl { 0 { ##1 } }
92     \tl_put_right:Nn \l__envopt_m_spec_tl { m }
93   }
94
95   \int_step_inline:nn { \l__envopt_mand_count_int }
96   {
97     \tl_put_right:Nn \l__envopt_arg_spec_tl { m }
98     \tl_put_right:Nn \l__envopt_m_spec_tl { m }
99   }
100
101 % 1. Define Backing Begin command (m...m)
102 \use:x {
103   \exp_not:N \DeclareDocumentCommand \exp_not:c { envopt@ \tl_use:N \l__envopt_name_tl @begin
104   { \exp_not:V \l__envopt_m_spec_tl }
105   { \exp_not:V \l__envopt_begin_code_tl }
106 }
107
108 % 2. Define Backing End command

```

```

109 \use:x {
110   \exp_not:N \DeclareDocumentCommand \exp_not:c { envopt@ \tl_use:N \l__envopt_name_tl @end }
111   { }
112   { \exp_not:V \l__envopt_end_code_tl }
113 }
114
115 % 3. Build Wrapper Body: \backing {#1}{#2}...
116 \tl_set:Nn \l_tmpa_tl { \use:c { envopt@ \tl_use:N \l__envopt_name_tl @begin } }
117
118 \int_compare:nNnTF { \l__envopt_total_count_int } > { 0 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
119 \int_compare:nNnTF { \l__envopt_total_count_int } > { 1 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
120 \int_compare:nNnTF { \l__envopt_total_count_int } > { 2 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
121 \int_compare:nNnTF { \l__envopt_total_count_int } > { 3 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
122 \int_compare:nNnTF { \l__envopt_total_count_int } > { 4 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
123 \int_compare:nNnTF { \l__envopt_total_count_int } > { 5 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
124 \int_compare:nNnTF { \l__envopt_total_count_int } > { 6 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
125 \int_compare:nNnTF { \l__envopt_total_count_int } > { 7 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
126 \int_compare:nNnTF { \l__envopt_total_count_int } > { 8 } { \tl_put_right:Nn \l_tmpa_tl { { #1 } { #2 } } }
127
128 \use:x {
129   \exp_not:N \DeclareDocumentEnvironment { \tl_use:N \l__envopt_name_tl } { \exp_not:V \l__envopt_end_code_tl }
130   {
131     \exp_not:V \l_tmpa_tl
132   }
133   {
134     \exp_not:N \use:c { envopt@ \tl_use:N \l__envopt_name_tl @end }
135   }
136 }
137 }
138
139 % --- \beginoptionals Implementation ---
140
141 \NewDocumentCommand{\beginoptionals}{ m }
142 {
143   \tl_set:Nn \l__envopt_name_tl { #1 }
144   \prop_get:NnNTF \g__envopt_metadata_prop { #1 } \l_tmpa_tl
145   {
146     \exp_after:wN \__envopt_split_counts:w \l_tmpa_tl \q_stop
147     \int_set:Nn \l__envopt_total_count_int { \l__envopt_opt_count_int + \l__envopt_mand_count_int }
148     \seq_clear:N \l__envopt_values_seq
149     \__envopt_scan_args_opt:n { \l__envopt_opt_count_int }
150   }
151   {
152     \__envopt_grab_counts:w
153   }
154 }
155
156 \NewDocumentCommand{ \__envopt_grab_counts:w } { O{0} O{0} }
157 {
158   \int_set:Nn \l__envopt_opt_count_int { #1 }

```

```

159  \int_set:Nn \l__envopt_mand_count_int { #2 }
160  \int_set:Nn \l__envopt_total_count_int { #1 + #2 }
161  \seq_clear:N \l__envopt_values_seq
162  \__envopt_scan_args_opt:n { \l__envopt_opt_count_int }
163 }
164
165 \cs_new:Npn \__envopt_split_counts:w #1 : #2 \q_stop
166 {
167  \int_set:Nn \l__envopt_opt_count_int { #1 }
168  \int_set:Nn \l__envopt_mand_count_int { #2 }
169 }
170
171 \cs_new_protected_nopar:Npn \__envopt_scan_args_opt:n #1
172 {
173  \int_compare:nNnTF { #1 } > { 0 }
174  {
175   \__envopt_grab_arg_opt:n { #1 }
176  }
177  {
178   \__envopt_scan_args_mand:n { \l__envopt_mand_count_int }
179  }
180 }
181
182 \NewDocumentCommand{ \__envopt_grab_arg_opt:n } { m r[] }
183 {
184  \seq_put_right:Nn \l__envopt_values_seq { #2 }
185  \__envopt_scan_args_opt:n { \int_eval:n { #1 - 1 } }
186 }
187
188 \cs_new_protected_nopar:Npn \__envopt_scan_args_mand:n #1
189 {
190  \int_compare:nNnTF { #1 } > { 0 }
191  {
192   \__envopt_grab_arg_mand:n { #1 }
193  }
194  {
195   \__envopt_read_body_capture:w
196  }
197 }
198
199 \NewDocumentCommand{ \__envopt_grab_arg_mand:n } { m m }
200 {
201  \seq_put_right:Nn \l__envopt_values_seq { #2 }
202  \__envopt_scan_args_mand:n { \int_eval:n { #1 - 1 } }
203 }
204
205 \cs_new_protected_nopar:Npn \__envopt_read_body_capture:w #1 \endoptionals #2
206 {
207  \str_if_eq:VnTF \l__envopt_name_tl { #2 }
208  {

```

```

209     \__envopt_execute:n { #1 }
210   }
211   {
212     \msg_error:nnxx { environmentoptional } { name-mismatch }
213     { \tl_use:N \l__envopt_name_tl }
214     { #2 }
215   }
216 }
217
218 \cs_new_protected_nopar:Npn \__envopt_execute:n #1
219 {
220   \cs_if_exist:cTF { envopt@tl_use:N \l__envopt_name_tl @begin }
221   {
222     \tl_set:Nn \l__envopt_exec_tl { \use:c { envopt@tl_use:N \l__envopt_name_tl @begin } }
223     \seq_map_inline:Nn \l__envopt_values_seq
224     {
225       \tl_put_right:Nn \l__envopt_exec_tl { { ##1 } }
226     }
227     \l__envopt_exec_tl
228     #1
229     \use:c { envopt@tl_use:N \l__envopt_name_tl @end }
230   }
231   {
232     \tl_clear:N \l__envopt_arg_spec_tl
233     \int_step_inline:nn { \l__envopt_total_count_int } { \tl_put_right:Nn \l__envopt_arg_spec_tl
234
235     \use:x {
236       \exp_not:N \DeclareDocumentCommand \exp_not:N \__envopt_temp_cmd { \exp_not:V \l__envopt
237         { \exp_not:n { #1 } }
238     }
239
240     \tl_set:Nn \l__envopt_exec_tl { \__envopt_temp_cmd }
241     \seq_map_inline:Nn \l__envopt_values_seq
242     {
243       \tl_put_right:Nn \l__envopt_exec_tl { { ##1 } }
244     }
245     \l__envopt_exec_tl
246   }
247 }
248
249 \NewDocumentCommand{\endoptionals}{ m }{ {} }
250
251 \ExplSyntaxOff
252

```