The environmentoptional package*

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1 Introduction

The `environmentoptional` package provides an alternative to LaTeX'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{`⟨*name*⟩`}[`⟨*n_ opt*⟩`][`⟨*n_ mand*⟩`][`⟨*def1*⟩`]...{`⟨*begin code*⟩`}{`⟨*end code*⟩`}`

where ⟨*n_ opt*⟩ is the number of optional arguments and ⟨*n_ mand*⟩ the number of mandatory arguments. You can optionally specify default values for the optional arguments in square brackets.

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

> `\beginoptionals{`⟨*name*⟩`}[`⟨*opt1*⟩`]...{`⟨*mand1*⟩`}...`

`\endoptionals` And close it with:

> `\endoptionals{`⟨*name*⟩`}`

3 Implementation

```
\RequirePackage{xparse}

\ExplSyntaxOn

% --- Global Metadata Storage ---
\prop_new:N \g__envopt_metadata_prop
\cs_new_protected_nopar:Npn \__envopt_sep { }
```

*This document corresponds to environmentoptional v1.14, dated 2026/02/13.

```
8
9 % --- Variables ---
10 \int_new:N \g__envopt_opt_count_int
11 \int_new:N \g__envopt_mand_count_int
12 \int_new:N \g__envopt_total_count_int
13 \tl_new:N \g__envopt_name_tl
14
15 \tl_new:N \l__envopt_arg_spec_tl
16 \tl_new:N \l__envopt_m_spec_tl
17 \tl_new:N \l__envopt_exec_tl
18 \tl_new:N \l__envopt_begin_code_tl
19 \tl_new:N \l__envopt_end_code_tl
20
21 \seq_new:N \l__envopt_def_vals_seq
22 \seq_new:N \l__envopt_values_seq
23 \tl_new:N \l__envopt_defaults_tl
24
25 % --- Error messages ---
26 \msg_new:nnn { environmentoptional } { name-mismatch }
27 {
28   Environment~name~mismatch.~Expected~'#1',~but~got~'#2'~in~\token_to_str:N \endoptionals.
29 }
30
31 \msg_new:nnn { environmentoptional } { too-many-args }
32 {
33   The~sum~of~optional~(#1)~and~mandatory~(#2)~arguments~must~be~maximum~9.
34 }
35
36 % --- Helpers ---
37
38 \cs_new_protected:Npn \__envopt_scan_defaults:nn #1 #2
39 {
40   \int_compare:nNnTF { #1 } > { 0 }
41   {
42     \peek_meaning_ignore_spaces:NTF [
43       { \__envopt_grab_default:nn { #1 } { #2 } }
44       {
45         \seq_put_right:Nn \l__envopt_def_vals_seq { }
46         \__envopt_scan_defaults:nn { \int_eval:n { #1 - 1 } } { #2 }
47       }
48   }
49   {
50     #2
51   }
52 }
53
54 \NewDocumentCommand{ \__envopt_grab_default:nn } { m m r[] }
55 {
56   \seq_put_right:Nn \l__envopt_def_vals_seq { #3 }
57   \__envopt_scan_defaults:nn { \int_eval:n { #1 - 1 } } { #2 }
```

```
}

% --- \newenvironmentoptionals Implementation ---

\NewDocumentCommand{\newenvironmentoptionals}{ m O{0} O{0} }
{
  \tl_gset:Nn \g__envopt_name_tl { #1 }
  \int_gset:Nn \g__envopt_opt_count_int { #2 }
  \int_gset:Nn \g__envopt_mand_count_int { #3 }
  \int_gset:Nn \g__envopt_total_count_int { #2 + #3 }

  \int_compare:nNnTF { \g__envopt_total_count_int } > { 9 }
  {
    \msg_error:nnxx { environmentoptional } { too-many-args }
    { \int_use:N \g__envopt_opt_count_int }
    { \int_use:N \g__envopt_mand_count_int }
  }
  {
    \seq_clear:N \l__envopt_def_vals_seq
    \__envopt_scan_defaults:nn { #2 } { \__envopt_read_env_code:w }
  }
}

\NewDocumentCommand{ \__envopt_read_env_code:w } { +m +m }
{
  \tl_set:Nn \l__envopt_begin_code_tl { #1 }
  \tl_set:Nn \l__envopt_end_code_tl { #2 }
  \__envopt_define_all:
}

\cs_new_protected_nopar:Npn \__envopt_define_all:
{
  \tl_clear:N \l__envopt_arg_spec_tl
  \tl_clear:N \l__envopt_m_spec_tl

  \seq_map_inline:Nn \l__envopt_def_vals_seq
  {
    \tl_put_right:Nn \l__envopt_arg_spec_tl { O { ##1 } }
    \tl_put_right:Nn \l__envopt_m_spec_tl { m }
  }

  \int_step_inline:nn { \g__envopt_mand_count_int }
  {
    \tl_put_right:Nn \l__envopt_arg_spec_tl { m }
    \tl_put_right:Nn \l__envopt_m_spec_tl { m }
  }

  % Store defaults as delimited string
  \tl_set:Nx \l_tmpa_tl { \seq_use:Nn \l__envopt_def_vals_seq { ||ENVOPTSEP|| } }

```

```
\use:x {
  \exp_not:N \prop_get:NnNTF \exp_not:N \g__envopt_metadata_prop
    { \exp_not:V \g__envopt_name_tl } \exp_not:N \l_tmpb_tl
    { } { }
  \exp_not:N \prop_gput:Nnn \exp_not:N \g__envopt_metadata_prop
    { \exp_not:V \g__envopt_name_tl }
    {
      \int_use:N \g__envopt_opt_count_int :
      \int_use:N \g__envopt_mand_count_int :
      { \exp_not:V \l_tmpa_tl }
    }
}

% 1. Define Backing Begin command (m...m)
\use:x {
  \exp_not:N \DeclareDocumentCommand \exp_not:c { envopt@ \tl_use:N \g__envopt_name_tl @begin
  { \exp_not:V \l__envopt_m_spec_tl }
  { \exp_not:V \l__envopt_begin_code_tl }
}

% 2. Define Backing End command
\use:x {
  \exp_not:N \DeclareDocumentCommand \exp_not:c { envopt@ \tl_use:N \g__envopt_name_tl @end }
  { }
  { \exp_not:V \l__envopt_end_code_tl }
}

% 3. Build Wrapper Body: \backing {#1}{#2}...
\tl_set:Nn \l_tmpa_tl { \use:c { envopt@ \tl_use:N \g__envopt_name_tl @begin } }

\int_compare:nNnTF { \g__envopt_total_count_int } > { 0 } { \tl_put_right:Nn \l_tmpa_tl { { #
\int_compare:nNnTF { \g__envopt_total_count_int } > { 1 } { \tl_put_right:Nn \l_tmpa_tl { { #
\int_compare:nNnTF { \g__envopt_total_count_int } > { 2 } { \tl_put_right:Nn \l_tmpa_tl { { #
\int_compare:nNnTF { \g__envopt_total_count_int } > { 3 } { \tl_put_right:Nn \l_tmpa_tl { { #
\int_compare:nNnTF { \g__envopt_total_count_int } > { 4 } { \tl_put_right:Nn \l_tmpa_tl { { #
\int_compare:nNnTF { \g__envopt_total_count_int } > { 5 } { \tl_put_right:Nn \l_tmpa_tl { { #
\int_compare:nNnTF { \g__envopt_total_count_int } > { 6 } { \tl_put_right:Nn \l_tmpa_tl { { #
\int_compare:nNnTF { \g__envopt_total_count_int } > { 7 } { \tl_put_right:Nn \l_tmpa_tl { { #
\int_compare:nNnTF { \g__envopt_total_count_int } > { 8 } { \tl_put_right:Nn \l_tmpa_tl { { #

\use:x {
  \exp_not:N \DeclareDocumentEnvironment { \tl_use:N \g__envopt_name_tl } { \exp_not:V \l__en
  {
     \exp_not:V \l_tmpa_tl
  }
  {
     \exp_not:N \use:c { envopt@ \tl_use:N \g__envopt_name_tl @end }
  }
}
}
```

```
158
159 % --- \beginoptionals Implementation ---
160
161 \NewDocumentCommand{\beginoptionals}{ m }
162 {
163   \tl_gset:Nn \g__envopt_name_tl { #1 }
164   \prop_get:NnNTF \g__envopt_metadata_prop { #1 } \l_tmpa_tl
165   {
166     \exp_after:wN \__envopt_split_metadata:w \l_tmpa_tl \q_stop
167     \int_gset:Nn \g__envopt_total_count_int { \g__envopt_opt_count_int + \g__envopt_mand_count_
168     \seq_clear:N \l__envopt_values_seq
169     \__envopt_scan_args_opt:n { \g__envopt_opt_count_int }
170   }
171   {
172     \__envopt_grab_counts:w
173   }
174 }
175
176 \NewDocumentCommand{ \__envopt_grab_counts:w } { O{0} O{0} }
177 {
178   \int_gset:Nn \g__envopt_opt_count_int { #1 }
179   \int_gset:Nn \g__envopt_mand_count_int { #2 }
180   \int_gset:Nn \g__envopt_total_count_int { #1 + #2 }
181   \seq_clear:N \l__envopt_values_seq
182   \seq_clear:N \l__envopt_def_vals_seq
183   \__envopt_scan_defaults:nn { #1 } { \__envopt_scan_args_opt:n { #1 } }
184 }
185
186 \cs_new:Npn \__envopt_split_metadata:w #1 : #2 : #3 \q_stop
187 {
188   \int_gset:Nn \g__envopt_opt_count_int { #1 }
189   \int_gset:Nn \g__envopt_mand_count_int { #2 }
190   \tl_set:Nn \l_tmpa_tl { #3 }
191   \seq_set_split:Nnn \l__envopt_def_vals_seq { ||ENVOPTSEP|| } { #3 }
192 }
193
194 \cs_new_protected_nopar:Npn \__envopt_scan_args_opt:n #1
195 {
196   \int_compare:nNnTF { #1 } > { 0 }
197   {
198     \peek_meaning_ignore_spaces:NTF [
199       { \__envopt_grab_arg_opt:n { #1 } }
200       { \__envopt_fill_defaults:n { #1 } }
201   }
202   {
203     \__envopt_scan_args_mand:n { \g__envopt_mand_count_int }
204   }
205 }
206
207 \cs_new_protected_nopar:Npn \__envopt_fill_defaults:n #1
```

```
{
  \int_compare:nNnTF { #1 } > { 0 }
  {
    \seq_pop_left:NN \l__envopt_def_vals_seq \l_tmpa_tl
    \seq_put_right:NV \l__envopt_values_seq \l_tmpa_tl
    \__envopt_fill_defaults:n { \int_eval:n { #1 - 1 } }
  }
  {
    \__envopt_scan_args_mand:n { \g__envopt_mand_count_int }
  }
}

\NewDocumentCommand{ \__envopt_grab_arg_opt:n } { m r[] }
{
  \seq_put_right:Nn \l__envopt_values_seq { #2 }
  \seq_pop_left:NN \l__envopt_def_vals_seq \l_tmpa_tl
  \__envopt_scan_args_opt:n { \int_eval:n { #1 - 1 } }
}

\cs_new_protected_nopar:Npn \__envopt_scan_args_mand:n #1
{
  \int_compare:nNnTF { #1 } > { 0 }
  {
    \__envopt_grab_arg_mand:n { #1 }
  }
  {
    \__envopt_read_body_capture:w
  }
}

\NewDocumentCommand{ \__envopt_grab_arg_mand:n } { m m }
{
  \seq_put_right:Nn \l__envopt_values_seq { #2 }
  \__envopt_scan_args_mand:n { \int_eval:n { #1 - 1 } }
}

\cs_new_protected_nopar:Npn \__envopt_read_body_capture:w #1 \endoptionals #2
{
  \tl_set:Nn \l_tmpa_tl { #2 }
  \str_if_eq:VVTF \g__envopt_name_tl \l_tmpa_tl
  {
    \__envopt_execute:n { #1 }
  }
  {
    \msg_error:nnxx { environmentoptional } { name-mismatch }
    { \tl_use:N \g__envopt_name_tl }
    { #2 }
  }
}

```

```
\cs_new_protected_nopar:Npn \__envopt_execute:n #1
{
  \cs_if_exist:cTF { envopt@\tl_use:N \g__envopt_name_tl @begin }
  {
    \tl_set:Nn \l__envopt_exec_tl { \use:c { envopt@\tl_use:N \g__envopt_name_tl @begin } }
    \seq_map_inline:Nn \l__envopt_values_seq
    {
       \tl_put_right:Nn \l__envopt_exec_tl { { ##1 } }
    }
    \l__envopt_exec_tl
    #1
    \use:c { envopt@\tl_use:N \g__envopt_name_tl @end }
  }
  {
    \tl_clear:N \l__envopt_arg_spec_tl
    \int_step_inline:nn { \g__envopt_total_count_int } { \tl_put_right:Nn \l__envopt_arg_spec_t

    \use:x {
       \exp_not:N \DeclareDocumentCommand \exp_not:N \__envopt_temp_cmd { \exp_not:V \l__envopt
       { \exp_not:n { #1 } }
    }

    \tl_set:Nn \l__envopt_exec_tl { \__envopt_temp_cmd }
    \seq_map_inline:Nn \l__envopt_values_seq
    {
       \tl_put_right:Nn \l__envopt_exec_tl { { ##1 } }
    }
    \l__envopt_exec_tl
  }
}

\NewDocumentCommand{\endoptionals}{ m }{}

\ExplSyntaxOff

```