

# The fontscale package

A flexible interface for setting font sizes

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## 1 Loading the package

```
% LaTeX2e version 2023-11-01 added \IfExplAtLeastTF.
\NeedsTeXFormat{LaTeX2e}[2023-11-01]
\DeclareRelease{v3}{2025-02-13}{fontscale-v3.sty}
\DeclareCurrentRelease{}{2025-03-02}
\ProvidesExplPackage{fontscale}{2025-03-02}{4.0.0}
  {A flexible interface for setting font sizes}

% l3kernel version 2023-11-09 added documentation for \c_nan_fp.
\IfExplAtLeastTF { 2023-11-09 } { }
  {
    \msg_new:nnn { fontscale } { l3kernel-out-of-date }
    {
      The~ fontscale~ package~ could~ not~ load. \\
      This~ package~ requires~
      L3~ programming~ layer~ version~ 2023-11-09~ or~ newer.
    }
    \msg_critical:n { fontscale } { l3kernel-out-of-date }
  }

% fontscale defines \scalefont.
\cs_new_protected:Npn \__fontscale_hook_scalefont:
  {
    \msg_new:nnn { fontscale } { package-scalefnt-incompatible }
    {
      The~ fontscale~ package~ is~ incompatible~ with~ the~ 'scalefnt'~
      package.
    }
    \msg_error:nn { fontscale } { package-scalefnt-incompatible }
  }
\hook_gput_code:nnn { package / scalefnt / before } { fontscale }
  { \__fontscale_hook_scalefont: }
```

## 2 Messages

```
\msg_new:nnn { fontscale } { key-musical-base-invalid }
  {
    Invalid~ value~ '#1'~ \msg_line_context:.. \\
  }
```

```

    The~ value~ of~ the~ key~ 'musical / base'~ must~ be~ a~ positive~ length.
}
\msg_new:nnn { fontscale } { key-musical-ratio-invalid }
{
  Invalid~ value~ '#1'~ \msg_line_context:. \\\
  The~ value~ of~ the~ key~ 'musical / ratio'~ must~ be~ greater~ than~ 1.
}
\msg_new:nnn { fontscale } { key-musical-notes-invalid }
{
  Invalid~ value~ '#1'~ \msg_line_context:. \\\
  The~ value~ of~ the~ key~ 'musical / notes'~ must~ be~ a~ positive~
  integer.
}
\msg_new:nnn { fontscale } { key-font-scale-invalid }
{
  Invalid~ value~ '#2'~ \msg_line_context:. \\\
  The~ value~ of~ the~ key~ '#1 / scale'~ must~ be~ positive.
}
\msg_new:nnn { fontscale } { key-font-size-invalid }
{
  Invalid~ value~ '#2'~ \msg_line_context:. \\\
  The~ value~ of~ the~ key~ '#1 / size'~ must~ be~ a~ positive~ length.
}
\msg_new:nnn { fontscale } { key-font-scale-overwritten }
{
  The~ font~ size~ set~ by~ the~ key~ '#1 / scale'~
  has~ been~ overwritten~ by~ the~ key~ '#1 / size'~ \msg_line_context:.
}
\msg_new:nnn { fontscale } { font-sizes-wrong-order }
{
  The~ font~ sizes~ are~ not~ in~ the~ correct~ order~ \msg_line_context:. \\\
  The~ lengths~ of~ the~ font~ sizes~ should~ be~ ordered~ from~
  \iow_char:N \\\tiny~ to~ \iow_char:N \\\Huge.
}

% This package tests for math mode only at the user level because this is not
% necessary for programmers. To avoid confusion, this package issues a warning
% when \fontsize + \selectfont would be used in math mode because it would not
% change the math font size.
\msg_new:nnn { fontscale } { math-mode-warning }
{ '#1'~ does~ nothing~ if~ used~ in~ math~ mode~ \msg_line_context:. }
% \@ and \par cannot be used in math mode.
\msg_new:nnn { fontscale } { math-mode-error }
{ '#1'~ cannot~ be~ used~ in~ math~ mode~ \msg_line_context:. }
\msg_new:nnn { fontscale } { font-size-invalid }
{
  Invalid~ font~ size~ '#1'~ \msg_line_context:. \\\
  The~ font~ size~ must~ be~ a~ positive~ length.
}

```

```

}
\msg_new:nnn { fontscale } { font-step-invalid }
{
  Invalid~ font~ step~ '#1'~ \msg_line_context:. \\
  The~ font~ step~ must~ equal~ the~ font~ step~ of~
  any~ font~ size~ command~ from~ \iow_char:N \tiny~ to~ \iow_char:N \Huge~
  unless~ the~ value~ of~ the~ key~ 'typographic-scale'~ is~ 'musical'.
}
\msg_new:nnn { fontscale } { current-font-step-invalid }
{
  The~ new~ font~ step~ could~ not~ be~ calculated~
  because~ the~ current~ font~ step~ is~ undefined~ \msg_line_context:.
}

```

### 3 Some variables

% Declares and initializes the font step, font scale, font size, and font  
% baselineskip of each font size command from \tiny to \Huge.

```

\fp_const:Nn \c_fontscale_tiny_step_fp      { -4 }
\fp_const:Nn \c_fontscale_scriptsize_step_fp { -3 }
\fp_const:Nn \c_fontscale_footnotesize_step_fp { -2 }
\fp_const:Nn \c_fontscale_small_step_fp     { -1 }
\fp_const:Nn \c_fontscale_normalsize_step_fp { 0 }
\fp_const:Nn \c_fontscale_large_step_fp     { 1 }
\fp_const:Nn \c_fontscale_Large_step_fp     { 2 }
\fp_const:Nn \c_fontscale_LARGE_step_fp     { 3 }
\fp_const:Nn \c_fontscale_huge_step_fp      { 4 }
\fp_const:Nn \c_fontscale_Huge_step_fp      { 5 }

```

```

\fp_const:Nn \c_fontscale_normalsize_scale_fp { 1 }

```

```

\fp_new:N \l_fontscale_tiny_scale_fp
\fp_new:N \l_fontscale_scriptsize_scale_fp
\fp_new:N \l_fontscale_footnotesize_scale_fp
\fp_new:N \l_fontscale_small_scale_fp
\fp_new:N \l_fontscale_large_scale_fp
\fp_new:N \l_fontscale_Large_scale_fp
\fp_new:N \l_fontscale_LARGE_scale_fp
\fp_new:N \l_fontscale_huge_scale_fp
\fp_new:N \l_fontscale_Huge_scale_fp

```

```

\dim_new:N \l_fontscale_tiny_size_dim
\dim_new:N \l_fontscale_scriptsize_size_dim
\dim_new:N \l_fontscale_footnotesize_size_dim
\dim_new:N \l_fontscale_small_size_dim

```

```

\dim_new:N \l_fontscale_normalsize_size_dim
\dim_new:N \l_fontscale_large_size_dim
\dim_new:N \l_fontscale_Large_size_dim
\dim_new:N \l_fontscale_LARGE_size_dim
\dim_new:N \l_fontscale_huge_size_dim
\dim_new:N \l_fontscale_Huge_size_dim

\skip_new:N \l_fontscale_tiny_baselineskip_skip
\skip_new:N \l_fontscale_scriptsize_baselineskip_skip
\skip_new:N \l_fontscale_footnotesize_baselineskip_skip
\skip_new:N \l_fontscale_small_baselineskip_skip
\skip_new:N \l_fontscale_normalsize_baselineskip_skip
\skip_new:N \l_fontscale_large_baselineskip_skip
\skip_new:N \l_fontscale_Large_baselineskip_skip
\skip_new:N \l_fontscale_LARGE_baselineskip_skip
\skip_new:N \l_fontscale_huge_baselineskip_skip
\skip_new:N \l_fontscale_Huge_baselineskip_skip

\fp_set:Nn \l_fontscale_tiny_scale_fp { 0.6 }
\fp_set:Nn \l_fontscale_scriptsize_scale_fp { 0.7 }
\fp_set:Nn \l_fontscale_footnotesize_scale_fp { 0.8 }
\fp_set:Nn \l_fontscale_small_scale_fp { 0.9 }
\fp_set:Nn \l_fontscale_large_scale_fp { 1.1 }
\fp_set:Nn \l_fontscale_Large_scale_fp { 1.2 }
\fp_set:Nn \l_fontscale_LARGE_scale_fp { 1.4 }
\fp_set:Nn \l_fontscale_huge_scale_fp { 1.6 }
\fp_set:Nn \l_fontscale_Huge_scale_fp { 1.8 }

\dim_set:Nn \l_fontscale_tiny_size_dim { 6pt }
\dim_set:Nn \l_fontscale_scriptsize_size_dim { 7pt }
\dim_set:Nn \l_fontscale_footnotesize_size_dim { 8pt }
\dim_set:Nn \l_fontscale_small_size_dim { 9pt }
\dim_set:Nn \l_fontscale_normalsize_size_dim { 10pt }
\dim_set:Nn \l_fontscale_large_size_dim { 11pt }
\dim_set:Nn \l_fontscale_Large_size_dim { 12pt }
\dim_set:Nn \l_fontscale_LARGE_size_dim { 14pt }
\dim_set:Nn \l_fontscale_huge_size_dim { 16pt }
\dim_set:Nn \l_fontscale_Huge_size_dim { 18pt }

\skip_set:Nn \l_fontscale_tiny_baselineskip_skip { 7.2pt }
\skip_set:Nn \l_fontscale_scriptsize_baselineskip_skip { 8.4pt }
\skip_set:Nn \l_fontscale_footnotesize_baselineskip_skip { 9.6pt }
\skip_set:Nn \l_fontscale_small_baselineskip_skip { 10.8pt }
\skip_set:Nn \l_fontscale_normalsize_baselineskip_skip { 12 pt }
\skip_set:Nn \l_fontscale_large_baselineskip_skip { 13.2pt }
\skip_set:Nn \l_fontscale_Large_baselineskip_skip { 14.4pt }
\skip_set:Nn \l_fontscale_LARGE_baselineskip_skip { 16.8pt }

```

```

\skip_set:Nn \l_fontscale_huge_baselineskip_skip { 19.2pt }
\skip_set:Nn \l_fontscale_Huge_baselineskip_skip { 21.6pt }

% Stores the current font step, font scale, font size, and font baselineskip.
% They are set in the selectfont hook.
\fp_new:N \l_fontscale_step_fp
\fp_new:N \l_fontscale_scale_fp
\dim_new:N \l_fontscale_size_dim
\skip_new:N \l_fontscale_baselineskip_skip

% For speed, \__fontscale_hook_selectfont: tries to avoid computing a floating
% point expression by using \fp_set_eq:NN when the font size equals the font
% size of any font size command from \tiny to \Huge. The case when the font
% size equals that of \normalsize is optimized further because it is by far
% the most common case. \f@size and \f@baselineskip are not used elsewhere in
% this package.
\cs_new_protected:Npn \__fontscale_hook_selectfont:
{
  \dim_set:Nn \l_fontscale_size_dim { \f@size pt }
  \skip_set:Nn \l_fontscale_baselineskip_skip { \f@baselineskip }
  \dim_compare:nNnTF \l_fontscale_size_dim = \l_fontscale_normalsize_size_dim
  {
    \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_normalsize_step_fp
    \fp_set_eq:NN \l_fontscale_scale_fp \c_fontscale_normalsize_scale_fp
  }
  { \__fontscale_hook_selectfont_auxi: }
}
\cs_new_protected:Npn \__fontscale_hook_selectfont_auxi:
{
  \dim_case:nnF { \l_fontscale_size_dim }
  {
    { \l_fontscale_small_size_dim }
    {
      \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_small_step_fp
      \fp_set_eq:NN \l_fontscale_scale_fp \l_fontscale_small_scale_fp
    }
    { \l_fontscale_large_size_dim }
    {
      \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_large_step_fp
      \fp_set_eq:NN \l_fontscale_scale_fp \l_fontscale_large_scale_fp
    }
    { \l_fontscale_footnotesize_size_dim }
    {
      \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_footnotesize_step_fp
      \fp_set_eq:NN \l_fontscale_scale_fp
      \l_fontscale_footnotesize_scale_fp
    }
  }
  { \l_fontscale_Large_size_dim }
}

```

```

{
  \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_Large_step_fp
  \fp_set_eq:NN \l_fontscale_scale_fp \l_fontscale_Large_scale_fp
}
{ \l_fontscale_scriptsize_size_dim }
{
  \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_scriptsize_step_fp
  \fp_set_eq:NN \l_fontscale_scale_fp \l_fontscale_scriptsize_scale_fp
}
{ \l_fontscale_LARGE_size_dim }
{
  \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_LARGE_step_fp
  \fp_set_eq:NN \l_fontscale_scale_fp \l_fontscale_LARGE_scale_fp
}
{ \l_fontscale_tiny_size_dim }
{
  \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_tiny_step_fp
  \fp_set_eq:NN \l_fontscale_scale_fp \l_fontscale_tiny_scale_fp
}
{ \l_fontscale_huge_size_dim }
{
  \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_huge_step_fp
  \fp_set_eq:NN \l_fontscale_scale_fp \l_fontscale_huge_scale_fp
}
{ \l_fontscale_Huge_size_dim }
{
  \fp_set_eq:NN \l_fontscale_step_fp \c_fontscale_Huge_step_fp
  \fp_set_eq:NN \l_fontscale_scale_fp \l_fontscale_Huge_scale_fp
}
}
{ \l_fontscale_hook_selectfont_auxii: }
}
\cs_new_protected:Npn \l_fontscale_hook_selectfont_auxii:
{
  \fp_set:Nn \l_fontscale_scale_fp
  {
    \dim_to_fp:n { \l_fontscale_size_dim } /
    \l_fontscale_normalsize_size_fp
  }
  \str_if_eq:VnTF \l_fontscale_typographic_scale_str { musical }
  {
    \fp_set:Nn \l_fontscale_step_fp
    {
      \l_fontscale_musical_selectfont_fp *
      ln
      (
        \dim_compare:nNnTF \l_fontscale_musical_base_dim =
        \l_fontscale_normalsize_size_dim
        { \l_fontscale_scale_fp }
      )
    }
  }
}

```

```

        {
          \dim_to_fp:n { \l_fontscale_size_dim } /
          \l__fontscale_musical_base_fp
        }
      )
    }
  { \fp_set_eq:NN \l_fontscale_step_fp \c_nan_fp }
}
\hook_gput_code:nnn { selectfont } { fontscale }
{ \__fontscale_hook_selectfont: }

% Used only to speed up floating point calculations.
\fp_new:N \l__fontscale_normalsize_size_fp
\fp_set:Nn \l__fontscale_normalsize_size_fp { 10 }
\fp_new:N \l__fontscale_musical_base_fp
\fp_new:N \l__fontscale_musical_notes_fp
\fp_new:N \l__fontscale_musical_selectfont_fp

\fp_const:Nn \c__fontscale_five_fp { 5 }

% Scratch variable
\fp_new:N \l__fontscale_tmp_fp

```

## 4 Some functions

```

% Variants of l3kernel functions
\cs_generate_variant:Nn \msg_error:nnnn { nnnv }
% Similar to \fontsize + \selectfont, except that it:
% (1) Takes dimen and skip expressions as arguments without appending a default
% unit of 'pt'.
% (2) Avoids the issue where \f@size is set to the new font size before the
% second argument is expanded.
% (3) Issues a user-friendly error message if the font size is not positive.
\cs_new_protected:Npn \__fontscale_set_font_size:nn #1#2
{
  \use:e
  {
    \__fontscale_set_font_size_aux:nn { \dim_eval:n {#1} }
    { \skip_eval:n {#2} }
  }
}
\cs_new_protected:Npn \__fontscale_set_font_size_aux:nn #1#2
{
  \dim_compare:nNnTF {#1} > \c_zero_dim
  { \fontsize {#1} {#2} \selectfont }
}

```

```

    { \msg_error:nnn { fontsize } { font-size-invalid } {#1} }
  }
% Similar to \__fontscale_set_font_size:nn, except that it sets the font
% baselineskip equal to the new font size times the baselineskip-size-ratio.
\cs_new_protected:Npn \__fontscale_set_font_size:n #1
  { \exp_args:Ne \__fontscale_set_font_size_aux:n { \dim_eval:n {#1} } }
\cs_new_protected:Npn \__fontscale_set_font_size_aux:n #1
  {
    \dim_compare:nNnTF {#1} > \c_zero_dim
    {
      \fontsize {#1}
      {
        \fp_to_dim:n
          { \dim_to_fp:n {#1} * \l__fontscale_baselineskip_size_ratio_fp }
      }
      \selectfont
    }
    { \msg_error:nnn { fontsize } { font-size-invalid } {#1} }
  }
}
\cs_new:Npn \__fontscale_fp_eval_round:n #1
  { \fp_eval:n { round ( #1 , \c__fontscale_five_fp ) } }

```

## 5 Define keys

```
\str_new:N \l__fontscale_typographic_scale_str
```

```

\keys_define:nn { fontsize }
  {
    baselineskip-size-ratio .fp_set:N =
      \l__fontscale_baselineskip_size_ratio_fp
    , baselineskip-size-ratio .value_required:n = true

    , typographic-scale .choices:nn =
      { classic-10pt , classic-11pt , classic-12pt , musical }
      { \str_set:Nn \l__fontscale_typographic_scale_str {#1} }
    , typographic-scale .value_required:n = true

    , classic-10pt .meta:n = { typographic-scale = classic-10pt }
    , classic-10pt .value_forbidden:n = true

    , classic-11pt .meta:n = { typographic-scale = classic-11pt }
    , classic-11pt .value_forbidden:n = true

    , classic-12pt .meta:n = { typographic-scale = classic-12pt }
    , classic-12pt .value_forbidden:n = true
  }

```



```

    , musical .meta:n = { typographic-scale = musical }
    , musical .value_forbidden:n = true
  }
\keys_define:nn { fontsize / musical }
{
  base .dim_set:N = \l__fontscale_musical_base_dim
  , base .value_required:n = true

  , ratio .fp_set:N = \l__fontscale_musical_ratio_fp
  , ratio .value_required:n = true

  , notes .int_set:N = \l__fontscale_musical_notes_int
  , notes .value_required:n = true
}
\keys_define:nn { fontsize / normalsize }
{
  size .tl_set:N = \l__fontscale_normalsize_size_tl
  , size .value_required:n = true

  , baselineskip .tl_set:N = \l__fontscale_normalsize_baselineskip_tl
  , baselineskip .value_required:n = true
}
\tl_map_inline:nn
{
  {tiny} {scriptsize} {footnotesize} {small}
  {large} {Large} {LARGE} {huge} {Huge}
}
{
  \keys_define:nn { fontsize / #1 }
  {
    scale .tl_set:c = { l__fontscale_#1_scale_tl }
    , scale .value_required:n = true

    , size .tl_set:c = { l__fontscale_#1_size_tl }
    , size .value_required:n = true

    , baselineskip .tl_set:c = { l__fontscale_#1_baselineskip_tl }
    , baselineskip .value_required:n = true
  }
}
\keys_define:nn { fontsize }
{
  tiny .tl_set:N = \l__fontscale_tiny_size_tl
  , tiny .value_required:n = true

  , scriptsize .tl_set:N = \l__fontscale_scriptsize_size_tl
  , scriptsize .value_required:n = true
}

```

```

, footnotesize .tl_set:N = \l__fontscale_footnotesize_size_tl
, footnotesize .value_required:n = true

, small .tl_set:N = \l__fontscale_small_size_tl
, small .value_required:n = true

, normalsize .tl_set:N = \l__fontscale_normalsize_size_tl
, normalsize .value_required:n = true

, large .tl_set:N = \l__fontscale_large_size_tl
, large .value_required:n = true

, Large .tl_set:N = \l__fontscale_Large_size_tl
, Large .value_required:n = true

, LARGE .tl_set:N = \l__fontscale_LARGE_size_tl
, LARGE .value_required:n = true

, huge .tl_set:N = \l__fontscale_huge_size_tl
, huge .value_required:n = true

, Huge .tl_set:N = \l__fontscale_Huge_size_tl
, Huge .value_required:n = true
}

```

## 6 Initialize and pre-compile keys

% Pre-compiles the keys with their initial values and then sets the keys to  
% their initial values. This is significantly faster than using .initial:n and  
% \keys\_precompile:nnN. The special value of \q\_no\_value is used to test if the  
% corresponding key has been set by the user.

```

\cs_new_protected:Npn \__fontscale_keys_set_initial:
{
  \fp_set:Nn \l__fontscale_baselineskip_size_ratio_fp { 1.2 }
  \str_set:Nn \l__fontscale_typographic_scale_str { classic-10pt }
  \dim_set:Nn \l__fontscale_musical_base_dim { 10pt }
  \fp_set:Nn \l__fontscale_musical_ratio_fp { 2 }
  \int_set:Nn \l__fontscale_musical_notes_int { 5 }

  \tl_map_inline:nn
  {
    \l__fontscale_tiny_scale_tl
    \l__fontscale_scriptsize_scale_tl
    \l__fontscale_footnotesize_scale_tl
    \l__fontscale_small_scale_tl

```

```

\l__fontscale_large_scale_tl
\l__fontscale_Large_scale_tl
\l__fontscale_LARGE_scale_tl
\l__fontscale_huge_scale_tl
\l__fontscale_Huge_scale_tl

\l__fontscale_tiny_size_tl
\l__fontscale_scriptsize_size_tl
\l__fontscale_footnotesize_size_tl
\l__fontscale_small_size_tl
\l__fontscale_normalsize_size_tl
\l__fontscale_large_size_tl
\l__fontscale_Large_size_tl
\l__fontscale_LARGE_size_tl
\l__fontscale_huge_size_tl
\l__fontscale_Huge_size_tl

\l__fontscale_tiny_baselineskip_tl
\l__fontscale_scriptsize_baselineskip_tl
\l__fontscale_footnotesize_baselineskip_tl
\l__fontscale_small_baselineskip_tl
\l__fontscale_normalsize_baselineskip_tl
\l__fontscale_large_baselineskip_tl
\l__fontscale_Large_baselineskip_tl
\l__fontscale_LARGE_baselineskip_tl
\l__fontscale_huge_baselineskip_tl
\l__fontscale_Huge_baselineskip_tl
}
{ \tl_set:Nn ##1 { \q_no_value } }
}
\__fontscale_keys_set_initial:

```

## 7 Set and process keys

```

\NewDocumentCommand \fontscalesetup { s m }
{
  \mode_if_math:TF
  {
    \msg_warning:nne { fontscale } { math-mode-warning }
    { \token_to_str:N \fontscalesetup }
  }
  {
    \IfBooleanTF #1
    { \__fontscale_keys_reset:n {#2} }
    { \__fontscale_keys_set:n {#2} }
  }
}

```

```

}
\cs_new_protected:Npn \__fontscale_keys_reset:n
{ \__fontscale_keys_set_initial: \__fontscale_keys_set:n }
\cs_new_protected:Npn \__fontscale_keys_set:n #1
{
  \keys_set:nn { fontscale } {#1}
  \__fontscale_keys_process:
  \normalsize
  \prg_break:
  \prg_break_point:
}
\cs_new_protected:Npn \__fontscale_keys_process:
{
  \__fontscale_keys_process_start:
  \__fontscale_keys_process_normalsize:
  \__fontscale_keys_process_other:
  \__fontscale_keys_process_check_order:
}
\cs_new_protected:Npn \__fontscale_keys_process_start:
{
  \dim_compare:nNnF \l__fontscale_musical_base_dim > \c_zero_dim
  {
    \msg_error:nnV { fontscale } { key-musical-base-invalid }
    \l__fontscale_musical_base_dim
    \prg_break:
  }
  \fp_compare:nNnF \l__fontscale_musical_ratio_fp > \c_one_fp
  {
    \msg_error:nne { fontscale } { key-musical-ratio-invalid }
    { \fp_use:N \l__fontscale_musical_ratio_fp }
    \prg_break:
  }
  \int_compare:nNnF \l__fontscale_musical_notes_int > 0
  {
    \msg_error:nnV { fontscale } { key-musical-notes-invalid }
    \l__fontscale_musical_notes_int
    \prg_break:
  }
}
% Sets the font size and font baselineskip of \normalsize. Its font size must
% be set before doing any processing involving the font scale.
\cs_new_protected:Npn \__fontscale_keys_process_normalsize:
{
  \quark_if_no_value:NTF \l__fontscale_normalsize_size_tl
  {
    \dim_set:Nn \l__fontscale_normalsize_size_dim
    {
      \str_case:Vn \l__fontscale_typographic_scale_str
      {

```

```

        { classic-10pt } { 10pt }
        { classic-11pt } { 11pt }
        { classic-12pt } { 12pt }
        { musical } { \l__fontscale_musical_base_dim }
    }
}
{
\dim_set:Nn \l_fontscale_normalsize_size_dim
  { \l__fontscale_normalsize_size_tl }
\dim_compare:nNnF \l_fontscale_normalsize_size_dim > \c_zero_dim
  {
    \msg_error:nnnV { fontscale } { key-font-size-invalid }
    { normalsize } \l_fontscale_normalsize_size_dim
    \prg_break:
  }
}
\fp_set:Nn \l__fontscale_normalsize_size_fp
  { \dim_to_fp:n { \l_fontscale_normalsize_size_dim } }
\skip_set:Nn \l_fontscale_normalsize_baselineskip_skip
  {
    \quark_if_no_value:NTF \l__fontscale_normalsize_baselineskip_tl
    {
      \fp_to_dim:n
      {
        \l__fontscale_normalsize_size_fp *
        \l__fontscale_baselineskip_size_ratio_fp
      }
    }
    { \l__fontscale_normalsize_baselineskip_tl }
  }
}
}
% Auxiliary functions that expand to the font size depending on the name of the
% font size command.
\cs_new:Npn \__fontscale_keys_process_other_classic_xpt:n #1
  {
    \str_case:nn {#1}
    {
      { tiny          } { 6pt }
      { scriptsize   } { 7pt }
      { footnotesize } { 8pt }
      { small         } { 9pt }
      { large         } { 11pt }
      { Large         } { 12pt }
      { LARGE         } { 14pt }
      { huge          } { 16pt }
      { Huge          } { 18pt }
    }
  }
}

```

```

\cs_new:Npn \__fontscale_keys_process_other_classic_xipt:n #1
{
  \str_case:nn {#1}
  {
    { tiny          } { 7pt }
    { scriptsize   } { 8pt }
    { footnotesize } { 9pt }
    { small        } { 10pt }
    { large        } { 12pt }
    { Large        } { 14pt }
    { LARGE        } { 16pt }
    { huge         } { 18pt }
    { Huge         } { 21pt }
  }
}

\cs_new:Npn \__fontscale_keys_process_other_classic_xiipn:n #1
{
  \str_case:nn {#1}
  {
    { tiny          } { 8pt }
    { scriptsize   } { 9pt }
    { footnotesize } { 10pt }
    { small        } { 11pt }
    { large        } { 14pt }
    { Large        } { 16pt }
    { LARGE        } { 18pt }
    { huge         } { 21pt }
    { Huge         } { 24pt }
  }
}

\cs_new:Npn \__fontscale_keys_process_other_musical:n #1
{
  \fp_to_dim:n
  {
    \l__fontscale_musical_base_fp * \l__fontscale_musical_ratio_fp ^
    ( \use:c { c_fontscale_#1_step_fp } / \l__fontscale_musical_notes_fp )
  }
}

% Sets the font size, font scale, and font baselineskip of the other font size
% commands.
\cs_new_protected:Npn \__fontscale_keys_process_other:
{
  \str_case:Vn \l__fontscale_typographic_scale_str
  {
    { classic-10pt }
    {
      \cs_set_eq:NN \__fontscale_keys_process_other_aux:n
      \__fontscale_keys_process_other_classic_xipt:n
    }
  }
}

```

```

{ classic-11pt }
{
  \cs_set_eq:NN \__fontscale_keys_process_other_aux:n
    \__fontscale_keys_process_other_classic_xipt:n
}
{ classic-12pt }
{
  \cs_set_eq:NN \__fontscale_keys_process_other_aux:n
    \__fontscale_keys_process_other_classic_xiipn:n
}
{ musical }
{
  \cs_set_eq:NN \__fontscale_keys_process_other_aux:n
    \__fontscale_keys_process_other_musical:n
  \fp_set:Nn \l__fontscale_musical_base_fp
    { \dim_to_fp:n { \l__fontscale_musical_base_dim } }
  \fp_set:Nn \l__fontscale_musical_notes_fp
    { \int_use:N \l__fontscale_musical_notes_int }
  \fp_set:Nn \l__fontscale_musical_selectfont_fp
    {
      \int_use:N \l__fontscale_musical_notes_int /
      ln ( \l__fontscale_musical_ratio_fp )
    }
}
}
\l_map_function:nN
{
  {tiny} {scriptsize} {footnotesize} {small}
  {large} {Large} {LARGE} {huge} {Huge}
}
\__fontscale_keys_process_other:n
}
\cs_new_protected:Npn \__fontscale_keys_process_other:n #1
{
  \quark_if_no_value:cF { l__fontscale_#1_scale_tl }
  {
    \dim_set:cn { l_fontscale_#1_size_dim }
    {
      \fp_to_dim:n
      {
        \l__fontscale_normalsize_size_fp *
        ( \use:c { l__fontscale_#1_scale_tl } )
      }
    }
  }
  \dim_compare:nNnF { \use:c { l_fontscale_#1_size_dim } } > \c_zero_dim
  {
    \l_map_break:n
    {
      \msg_error:nne { fontscale } { key-font-scale-invalid } {#1}
    }
  }
}

```

```

        { \fp_eval:n { \use:c { l__fontscale_#1_scale_tl } } }
    \prg_break:
    }
}
\quark_if_no_value:cT { l__fontscale_#1_size_tl } { \prg_break: }
}
\quark_if_no_value:cF { l__fontscale_#1_size_tl }
{
    \dim_set:cn { l_fontscale_#1_size_dim }
    { \use:c { l__fontscale_#1_size_tl } }
    \dim_compare:nNnF { \use:c { l_fontscale_#1_size_dim } } > \c_zero_dim
    {
        \tl_map_break:n
        {
            \msg_error:nnnv { fontscale } { key-font-size-invalid } {#1}
            { l_fontscale_#1_size_dim }
            \prg_break:
        }
    }
    \quark_if_no_value:cF { l__fontscale_#1_scale_tl }
    {
        \msg_warning:nnn { fontscale } { key-font-scale-overwritten } {#1}
    }
    \prg_break:
}
\dim_set:cn { l_fontscale_#1_size_dim }
{ \__fontscale_keys_process_other_aux:n {#1} }
\prg_break:
\prg_break_point:
\fp_set:cn { l_fontscale_#1_scale_fp }
{
    \dim_to_fp:n { \use:c { l_fontscale_#1_size_dim } } /
    \l__fontscale_normalsize_size_fp
}
\skip_set:cn { l_fontscale_#1_baselineskip_skip }
{
    \quark_if_no_value:cTF { l__fontscale_#1_baselineskip_tl }
    {
        \fp_to_dim:n
        {
            \dim_to_fp:n { \use:c { l_fontscale_#1_size_dim } } *
            \l__fontscale_baselineskip_size_ratio_fp
        }
    }
    { \use:c { l__fontscale_#1_baselineskip_tl } }
}
}
}
% Issues a warning if the font sizes are not in the correct order.
\cs_new_protected:Npn \__fontscale_keys_process_check_order:

```



```

{
  \dim_compare:nF
  {
    \l_fontscale_tiny_size_dim
    < \l_fontscale_scriptsize_size_dim
    < \l_fontscale_footnotesize_size_dim
    < \l_fontscale_small_size_dim
    < \l_fontscale_normalsize_size_dim
    < \l_fontscale_large_size_dim
    < \l_fontscale_Large_size_dim
    < \l_fontscale_LARGE_size_dim
    < \l_fontscale_huge_size_dim
    < \l_fontscale_Huge_size_dim
  }
  { \msg_warning:nn { fontscale } { font-sizes-wrong-order } }
}

```

## 8 Document commands

```

% Defines the standard LaTeX font size commands from \tiny to \Huge and
% initializes to \normalsize. Sets \@currsize only for compatibility. Need
% \dim_use:N only for compatibility with versions of the microtype package
% older than v3.2 2024-12-12. The internal functions are not used elsewhere for
% compatibility with hooks such as
% \AddToHook{cmd/<font size command>/after}{<code>}.
\tl_map_inline:nn
{
  {tiny} {scriptsize} {footnotesize} {small} {normalsize}
  {large} {Large} {LARGE} {huge} {Huge}
}
{
  \use:e
  {
    \DeclareDocumentCommand \exp_not:c {#1} { }
    {
      \exp_not:N \mode_if_math:TF
      {
        \msg_warning:nnn { fontscale } { math-mode-warning }
        { \token_to_str:c {#1} }
      }
      { \exp_not:c { __fontscale_#1: } }
    }
  }
  \cs_new_protected:cpe { __fontscale_#1: }
  {
    \cs_set_eq:NN \exp_not:N \@currsize \exp_not:c {#1}
    \exp_not:N \fontsize
  }
}

```

```

        { \exp_not:N \dim_use:N \exp_not:c { l_fontscale_#1_size_dim } }
        \exp_not:c { l_fontscale_#1_baselineskip_skip }
    \exp_not:N \selectfont
  }
}
\normalsize

\NewExpandableDocumentCommand \currentfontstep { } { \__fontscale_step: }
\cs_new:Npn \__fontscale_step:
  { \fp_if_nan:nF { \l_fontscale_step_fp } { \fp_use:N \l_fontscale_step_fp } }

\NewExpandableDocumentCommand \currentfontscale { } { \__fontscale_scale: }
\cs_new:Npn \__fontscale_scale: { \fp_use:N \l_fontscale_scale_fp }

\NewExpandableDocumentCommand \currentfontsize { } { \__fontscale_size: }
\cs_new:Npn \__fontscale_size: { \dim_use:N \l_fontscale_size_dim }

\NewExpandableDocumentCommand \currentfontbaselineskip { }
  { \__fontscale_baselineskip: }
\cs_new:Npn \__fontscale_baselineskip:
  { \skip_use:N \l_fontscale_baselineskip_skip }

\NewDocumentCommand \setfontstep { s m }
  {
    \mode_if_math:TF
    {
      \msg_warning:nne { fontscale } { math-mode-warning }
      { \token_to_str:N \setfontstep }
    }
    {
      \IfBooleanTF #1
      { \__fontscale_add_font_step:n {#2} }
      { \__fontscale_set_font_step:n {#2} }
    }
  }
\cs_new_protected:Npn \__fontscale_add_font_step:n #1
  {
    \fp_if_nan:nTF { \l_fontscale_step_fp }
    { \msg_error:nn { fontscale } { current-font-step-invalid } }
    { \__fontscale_set_font_step:n { (#1) + \l_fontscale_step_fp } }
  }
\cs_new_protected:Npn \__fontscale_set_font_step:n #1
  {
    \fp_set:Nn \l__fontscale_tmp_fp {#1}
    \str_case:enF { \__fontscale_fp_eval_round:n { \l__fontscale_tmp_fp } }
    {
      { -4 } { \tiny }
    }
  }

```

```

    { -3 } { \scriptsize }
    { -2 } { \footnotesize }
    { -1 } { \small }
    { 0 } { \normalsize }
    { 1 } { \large }
    { 2 } { \Large }
    { 3 } { \LARGE }
    { 4 } { \huge }
    { 5 } { \Huge }
  }
  {
    \str_if_eq:VnTF \l__fontscale_typographic_scale_str { musical }
    {
      \__fontscale_set_font_size:n
      {
        \fp_to_dim:n
        {
          \l__fontscale_musical_base_fp *
          \l__fontscale_musical_ratio_fp ^
          ( \l__fontscale_tmp_fp / \l__fontscale_musical_notes_fp )
        }
      }
    }
    {
      \msg_error:nne { fontscale } { font-step-invalid }
      { \fp_use:N \l__fontscale_tmp_fp }
    }
  }
}

\NewDocumentCommand \setfontscale { s m }
{
  \mode_if_math:TF
  {
    \msg_warning:nne { fontscale } { math-mode-warning }
    { \token_to_str:N \setfontscale }
  }
  {
    \IfBooleanTF #1
    { \__fontscale_add_font_scale:n {#2} }
    { \__fontscale_set_font_scale:n {#2} }
  }
}

\cs_new_protected:Npn \__fontscale_add_font_scale:n #1
{ \__fontscale_set_font_scale:n { (#1) + \l__fontscale_scale_fp } }
\cs_new_protected:Npn \__fontscale_set_font_scale:n #1
{
  \__fontscale_set_font_size:n

```

```

    { \fp_to_dim:n { (#1) * \l__fontscale_normalsize_size_fp } }
  }

\NewDocumentCommand \setfontsize { s m }
{
  \mode_if_math:TF
  {
    \msg_warning:nne { fontscale } { math-mode-warning }
    { \token_to_str:N \setfontsize }
  }
  {
    \IfBooleanTF #1
    { \__fontscale_add_font_size:n {#2} }
    { \__fontscale_set_font_size:n {#2} }
  }
}

\cs_new_protected:Npn \__fontscale_add_font_size:n #1
{ \__fontscale_set_font_size:n { (#1) + \l_fontscale_size_dim } }

\NewDocumentCommand \scalefont { m }
{
  \mode_if_math:TF
  {
    \msg_warning:nne { fontscale } { math-mode-warning }
    { \token_to_str:N \scalefont }
  }
  { \__fontscale_scale_font:n {#1} }
}

\cs_new_protected:Npn \__fontscale_scale_font:n #1
{
  \fp_set:Nn \l__fontscale_tmp_fp {#1}
  \__fontscale_set_font_size:nn
  {
    \fp_to_dim:n
    { \l__fontscale_tmp_fp * \dim_to_fp:n { \l_fontscale_size_dim } }
  }
  {
    \fp_to_dim:n
    {
      \l__fontscale_tmp_fp *
      \dim_to_fp:n { \l_fontscale_baselineskip_skip }
    }
  }
}

\NewDocumentCommand \setfontsizebaselineskip { m m }
{
  \mode_if_math:TF

```

```

    {
      \msg_warning:nne { fontsize } { math-mode-warning }
      { \token_to_str:N \setfontsizebaselineskip }
    }
  { \__fontscale_set_font_size:nn {#1} {#2} }
}

\NewDocumentCommand \setfontbaselineskip { s m }
{
  \mode_if_math:TF
  {
    \msg_warning:nne { fontsize } { math-mode-warning }
    { \token_to_str:N \setfontbaselineskip }
  }
  {
    \IfBooleanTF #1
    { \__fontscale_add_font_baselineskip:n {#2} }
    { \__fontscale_set_font_baselineskip:n {#2} }
  }
}

\cs_new_protected:Npn \__fontscale_add_font_baselineskip:n #1
{
  \__fontscale_set_font_baselineskip:n
  { (#1) + \l_fontscale_baselineskip_skip }
}

\cs_new_protected:Npn \__fontscale_set_font_baselineskip:n
{ \__fontscale_set_font_size:nn { \l_fontscale_size_dim } }

\NewDocumentCommand \printfontsizeparameters { }
{ \__fontscale_print_font_size_parameters: }
\cs_new_protected:Npn \__fontscale_print_font_size_parameters:
{
  step~ ==
  \fp_if_nan:nF { \l_fontscale_step_fp }
  { \__fontscale_fp_eval_round:n { \l_fontscale_step_fp } }
  ,~
  scale~ == \__fontscale_fp_eval_round:n { \l_fontscale_scale_fp } ,~
  size~ == \dim_use:N \l_fontscale_size_dim ,~
  baselineskip~ == \skip_use:N \l_fontscale_baselineskip_skip
}

\NewDocumentCommand \printallfontsizeparameters { }
{
  \mode_if_math:TF
  {
    \msg_error:nne { fontsize } { math-mode-error }
    { \token_to_str:N \printallfontsizeparameters }
  }
}

```

```

    { \_fontscale_print_all_font_size_parameters: }
  }
\cs_new_protected:Npn \_fontscale_print_all_font_size_parameters:
{
  \tl_map_inline:nn
  {
    {tiny} {scriptsize} {footnotesize} {small} {normalsize}
    {large} {Large} {LARGE} {huge} {Huge}
  }
  {
    \token_to_str:c {##1} \@ \c_colon_str \c_space_tl
    step~ =~ \fp_use:c { c_fontscale_##1_step_fp } ,~
    scale~ =~
    \str_if_eq:nnTF {##1} { normalsize }
      { 1 }
      {
        \_fontscale_fp_eval_round:n
        { \use:c { l_fontscale_##1_scale_fp } }
      }
    ,~
    size~ =~ \dim_use:c { l_fontscale_##1_size_dim } ,~
    baselineskip~ =~ \skip_use:c { l_fontscale_##1_baselineskip_skip }
    \str_if_eq:nnF {##1} { Huge } { \newline }
  }
}

\NewDocumentCommand \printssampletext { >{ \ReverseBoolean } s +m }
{
  \mode_if_math:TF
  {
    \msg_error:nne { fontscale } { math-mode-error }
    { \token_to_str:N \printssampletext }
  }
  {
    \IfBooleanTF #1
    { \_fontscale_print_sample_text_ascending_order:n {#2} }
    { \_fontscale_print_sample_text_descending_order:n {#2} }
  }
}

\cs_new_protected:Npn \_fontscale_print_sample_text_ascending_order:n #1
{
  \group_begin:
  \tl_map_inline:nn
  {
    { tiny \scriptsize \footnotesize \small \normalsize
    \large \Large \LARGE \huge \Huge
    }
    { ##1 #1 \par }
  }
}

```

```

    \group_end:
  }
\cs_new_protected:Npn \__fontscale_print_sample_text_descending_order:n #1
{
  \group_begin:
  \tl_map_inline:nn
  {
    \Huge \huge \LARGE \Large \large
    \normalsize \small \footnotesize \scriptsize \tiny
  }
  { ##1 #1 \par }
\group_end:
}

\NewDocumentCommand \printfontsizecommand { }
{
  \mode_if_math:TF
  {
    \msg_error:nne { fontscale } { math-mode-error }
    { \token_to_str:N \printfontsizecommand }
  }
  { \__fontscale_print_name: }
}

\cs_new_protected:Npn \__fontscale_print_name:
{
  \token_to_str:c
  {
    \dim_case:nmF { \l_fontscale_size_dim }
    {
      { \l_fontscale_tiny_size_dim      } { tiny      }
      { \l_fontscale_scriptsize_size_dim } { scriptsize }
      { \l_fontscale_footnotesize_size_dim } { footnotesize }
      { \l_fontscale_small_size_dim      } { small      }
      { \l_fontscale_normalsize_size_dim  } { normalsize }
      { \l_fontscale_large_size_dim      } { large      }
      { \l_fontscale_Large_size_dim      } { Large      }
      { \l_fontscale_LARGE_size_dim      } { LARGE      }
      { \l_fontscale_huge_size_dim       } { huge       }
      { \l_fontscale_Huge_size_dim       } { Huge       }
    }
    { undefined }
  }
}
\@
}

```

## 9 Purifying text

```
\NewExpandableDocumentCommand \_fontscale_use_none_sm:w { s m } { }
\tl_map_inline:nn
{
  \fontscalesetup
  \setfontstep
  \setfontscale
  \setfontsize
  \setfontbaselineskip
}
{ \text_declare_purify_equivalent:Nn #1 { \_fontscale_use_none_sm:w } }
\text_declare_purify_equivalent:Nn \scalefont { \use_none:n }
\text_declare_purify_equivalent:Nn \setfontsizebaselineskip { \use_none:nn }
```