The fontscale package

A flexible interface for setting font sizes

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1 Introduction

1.1 About

The fontscale package provides the following functionalities:

- Set font sizes using a classic or musical typographic scale (§2.1).
- Set arbitrary font sizes and font baselineskips for the standard LaTeX font size commands `\tiny`, `\scriptsize`, `\footnotesize`, `\small`, `\normalsize`, `\large`, `\Large`, `\LARGE`, `\huge`, and `\Huge` (§2.3).
- Set the font sizes and font baselineskips of the standard LaTeX font size commands mid-document or within a local group (§3.1).
- Provides expandable commands that expand to the current font size of `\normalsize` and the current font step, font scale, font size, or font baselineskip (§3.2).
- Provides additional font size commands, including setting the font size by setting the font step or font scale and setting the font size relative to the current font size using more robust tools than the scalefnt and relsize packages (§3.3).
- For LaTeX3 programmers, this package defines public expl3 variables that store the font step, font scale, font size, and font baselineskip of each font size command from `\tiny` to `\Huge` and the current font step, font scale, font size, and font baselineskip (§4.2).

1.2 Loading the package

If you still rely on a previous version of this package, you can declare:

```
\usepackage{fontscale}[=v3]
```

Requirements:

- LaTeX 2_ε version 2023-11-01 or newer
- l3kernel version 2023-11-09 or newer
- fontscale is incompatible with the scalefnt package.

You may need to ensure that your LaTeX installation is up-to-date before using this package.

fontscale does not load any other packages.

This package lets the user set arbitrary font sizes. This works with most fonts produced today, but, for historical reasons, the default Computer Modern font is available only in a number of discrete font sizes. If you get a warning that

Computer Modern is not available in the requested font size, you may need to add the following code before `\documentclass` to make Computer Modern available at arbitrary font sizes:

```
\RequirePackage{fix-cm}
```

Alternatively, you can use the Latin Modern font by loading the lmodern package.

The fontscale package has no package options. Instead, this package provides the command `\fontscalesetup{`⟨*key-value list*⟩`}` (§3.1) which sets the package keys (§2).

When loaded, this package uses `\normalsize` after defining and initializing the font size commands from `\tiny` to `\Huge`.

Many LaTeX document classes have a font size option (e.g. `10pt`, `11pt`, `12pt`) which not only changes the set of document font sizes, but also modifies additional settings such as the page layout and vertical spacing which were specifically designed to work with those font sizes. For this reason, you may want to set the document class font size option close to the font size of `\normalsize` set by this package.

This package defines each font size command from `\tiny` to `\Huge` using `\fontsize` and `\selectfont`. They have no additional functionality beyond that of `\fontsize` and `\selectfont`, except that they:

- Set the kernel command `\@currsize` equal to the font size command. This is needed only for compatibility.
- Do nothing, except issue a warning, if used in math mode.

Unlike the standard LaTeX document classes, the font size commands from `\tiny` to `\Huge` defined by this package do not change the vertical spacing for displayed math and list structures. If the user would like to add this functionality or perhaps other features to the font size commands, then they can use hooks, which are documented in lthooks and ltcmdhooks.

1.3 The font size parameters

When using the fontscale package, each font size, including the standard LaTeX font size commands from `\tiny` to `\Huge`, has a font step, font scale, font size, and font baselineskip. The latter two parameters are the familiar first and second arguments to `\fontsize{`⟨*dimen*⟩`}{`⟨*skip*⟩`}`. (The font baselineskip should not be confused with the paragraph baselineskip `\baselineskip`.) The font scale and font step are different ways of describing the font size. The font scale is the relative font size; the ratio of the font size to `\normalsize`, which has a font scale of 1. The font step is the number of font size gradations from `\normalsize`, which has a font step of 0. Table 1 displays the font step of each font size command.

Table 1: The font step of each font size command from `\tiny` to `\Huge`. These are constants and cannot be changed.

font size command	font step
`\tiny`	−4
`\scriptsize`	−3
`\footnotesize`	−2
`\small`	−1
`\normalsize`	0
`\large`	1
`\Large`	2
`\LARGE`	3
`\huge`	4
`\Huge`	5

1.4 Syntax

This package defines some keys and commands that take as a value or argument a ⟨*floating point expression*⟩, ⟨*integer expression*⟩, ⟨*dimen expression*⟩, or ⟨*skip expression*⟩. This syntax has the same representation as the arguments to `\fpeval`, `\inteval`, `\dimeval`, and `\skipeval`, respectively, documented in usrguide.

2 Keys

This section documents the keys provided by the fontscale package. This package has no package options. Set the package keys using `\fontscalesetup {`⟨*key-value list*⟩`}` (§3.1).

2.1 The key `typographic-scale`

The font sizes of the font size commands from `\tiny` to `\Huge` are initially set by the key `typographic-scale`.

`typographic-scale` = ⟨*choice*⟩ `initial = classic-10pt`

⟨*choice*⟩ must be any of the following: `classic-10pt`, `classic-11pt`, `classic-12pt`, `classic-10bp`, `classic-11bp`, `classic-12bp`, `classic-10dd`, `classic-11dd`, `classic-12dd`, `classic-10nd`, `classic-11nd`, `classic-12nd`, `musical`.

Sets the font size of each font size command from `\tiny` to `\Huge` using a classic or musical typographic scale. These are common methods of choosing a set of document font sizes. The initial value is `classic-10pt`. As a shortcut, each ⟨*choice*⟩ is also available as a standalone key. For example, the key

Table 2: The font size of each font size command from `\tiny` to `\Huge` in units of pt, bp, dd, or nd when using a classic typographic scale.

font size command	`classic-10pt`
	`classic-10bp`
	`classic-10dd`
	`classic-10nd`
		`classic-11pt`
		`classic-11bp`
		`classic-11dd`
		`classic-11nd`
			`classic-12pt`
			`classic-12bp`
			`classic-12dd`
			`classic-12nd`

`\tiny`	6	7	8
`\scriptsize`	7	8	9
`\footnotesize`	8	9	10
`\small`	9	10	11
`\normalsize`	10	11	12
`\large`	11	12	14
`\Large`	12	14	16
`\LARGE`	14	16	18
`\huge`	16	18	21
`\Huge`	18	21	24

`classic-10pt` is equivalent to the key `typographic-scale = classic-10pt` and the key `musical` is equivalent to the key `typographic-scale = musical`.

2.1.1 The classic typographic scale

The classic typographic scale consists of the traditional font sizes in points: 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 21, 24, 30, 36, 48, 60, and 72.[1] They have been used since the sixteenth century and are the default font sizes on most computer software. The named font size is the font size of `\normalsize`. The font sizes of the other font size commands are the adjacent font sizes in the classic typographic scale in the named unit of measurement. Table 2 displays the font size of each font size command when using a classic typographic scale.

2.1.2 The musical typographic scale

`musical/base` = ⟨*dimen expression*⟩	`initial = 10pt`
`musical/ratio` = ⟨*floating point expression*⟩	`initial = 2`
`musical/notes` = ⟨*integer expression*⟩	`initial = 5`

When using a musical typographic scale, the font sizes are calculated using the formula:[2]

$$f_i = f_0 \times r^{i/n} \tag{1}$$

1. See *The Elements of Typographic Style* by Robert Bringhurst.
2. I have referenced this article by Spencer Mortensen: `https://spencermortensen.com/articles/typographic-scale/`

Table 3: The font size of each font size command from `\tiny` to `\Huge` when using a musical typographic scale with the initial values. The font sizes are in units of pt and rounded to 2 decimal places.

font size command	`musical`
`\tiny`	5.74
`\scriptsize`	6.60
`\footnotesize`	7.58
`\small`	8.71
`\normalsize`	10
`\large`	11.49
`\Large`	13.20
`\LARGE`	15.16
`\huge`	17.41
`\Huge`	20

f_i is the font size with font step i. f_0 is the base font size. n is the number of musical notes—the number of font size gradations or steps above f_0. r is the musical ratio, the ratio of the highest to the lowest note f_n/f_0.

The key `musical/base` sets the base font size to the value of ⟨*dimen expression*⟩. The base font size is the font size of `\normalsize`. The initial value is 10 pt. The key `musical/ratio` sets the musical ratio to the result of computing the ⟨*floating point expression*⟩. The initial value is 2. The key `musical/notes` sets the number of musical notes to the value of ⟨*integer expression*⟩. The initial value is 5. Table 3 displays the font size of each font size command when using a musical typographic scale with the initial values.

2.2 The key `baselineskip-size-ratio`

The font baselineskips of the font size commands from `\tiny` to `\Huge` are initially set by the key `baselineskip-size-ratio`.

`baselineskip-size-ratio` = ⟨*floating point expression*⟩ `initial = 1.2`

Sets the font baselineskip of each font size command from `\tiny` to `\Huge` equal to its font size × the result of computing the ⟨*floating point expression*⟩. Sets the font baselineskip set by `\setfontstep`, `\setfontscale`, and `\setfontsize` equal to the new font size × the result of computing the ⟨*floating point expression*⟩ (§3.3). The initial value is 1.2.

2.3 Overwriting the previous keys

This subsection documents keys for setting the font sizes and font baselineskips of the font size commands from `\tiny` to `\Huge` in a more direct manner.

The user should take care to ensure that the lengths of the font sizes remain correctly ordered from `\tiny` to `\Huge`. This is important for typographic and syntactic consistency. If the font sizes are in the wrong order, then `\fontscalesetup` will issue a warning and some package features may not work correctly.

The syntax ⟨*font size command*⟩ represents the name of a font size command from `\tiny` to `\Huge`, omitting the backslash `\`.

⟨*font size command*⟩`/scale` = ⟨*floating point expression*⟩ `initial` = ⟨*not set*⟩

Sets the font size of ⟨*font size command*⟩ by setting its font scale to the result of computing the ⟨*floating point expression*⟩. Overwrites the font size set by the key `typographic-scale`. These keys are initially not set. The key `normalsize/scale` is not defined.

⟨*font size command*⟩`/size` = ⟨*dimen expression*⟩ `initial` = ⟨*not set*⟩

Sets the font size of ⟨*font size command*⟩ to the value of ⟨*dimen expression*⟩. Overwrites the font size set by the keys `typographic-scale` and ⟨*font size command*⟩`/scale`. Issues a warning when overwriting the font size set by the latter key. These keys are initially not set.

⟨*font size command*⟩ = ⟨*dimen expression*⟩

Sets the key ⟨*font size command*⟩`/size` = ⟨*dimen expression*⟩.

⟨*font size command*⟩`/baselineskip-size-ratio` = ⟨*floating point expression*⟩ `initial` = ⟨*not set*⟩

Sets the font baselineskip of ⟨*font size command*⟩ equal to its font size × the result of computing ⟨*floating point expression*⟩. Overwrites the font baselineskip set by the key `baselineskip-size-ratio`. These keys are initially not set.

⟨*font size command*⟩`/baselineskip` = ⟨*skip expression*⟩ `initial` = ⟨*not set*⟩

Sets the font baselineskip of ⟨*font size command*⟩ to the value of ⟨*skip expression*⟩. Overwrites the font baselineskip set by the keys `baselineskip-size-ratio` and ⟨*font size command*⟩`/baselineskip-size-ratio`. Issues a warning when overwriting the font baselineskip set by the latter key. These keys are initially not set.

2.4 The key magscale

`magscale` = ⟨*floating point expression*⟩ `initial` = ⟨*not set*⟩

Scales the font size and font baselineskip of each font size command from `\tiny` to `\Huge` by a factor equal to the result of computing the ⟨*floating point expression*⟩. The new font baselineskips have no stretch and shrink components. This key is applied after all the other keys. This key is initially not set.

3 Commands

This section documents the commands provided by the fontscale package.

3.1 Setting the keys

`\fontscalesetup` ⟨`*`⟩ `{`⟨*key-value list*⟩`}`

Sets and processes the fontscale package keys (§2) in ⟨*key-value list*⟩ and then uses `\normalsize`. Adding the optional star ⟨`*`⟩ first resets all the keys to their initial values. Can be used mid-document. The scope of the effect is local to the current group. Does nothing, except issue a warning, if used in math mode. `\fontscalesetup` should typically be used only once in the preamble or omitted if the user is satisfied with the initial font sizes and font baselineskips.

3.2 Expandable commands

```
\currentnormalsize
```

Expands to the current font size of `\normalsize`.

```
\currentfontstep
\currentfontscale
\currentfontsize
\currentfontbaselineskip
```

Expands to the current font step, font scale, font size, and font baselineskip, respectively. These commands do not expand the kernel command `\f@size`. They can be used for printing or within calculations.

For clarity, `\currentfontstep` will be explained in detail. If the current font size equals the font size of any font size command from `\tiny` to `\Huge`, then `\currentfontstep` expands to the font step of that font size command (Table 1). If not and if the value of the key `typographic-scale` is `musical`, then `\currentfontstep` expands to the font step calculated from the musical typographic scale (Equation 1). Otherwise, the current font step is undefined and `\currentfontstep` expands to nothing.

3.3 More font size commands

This package provides additional font size commands for use only in special cases. Users should prefer the standard LaTeX font size commands from `\tiny` to `\Huge` for typographic and syntactic consistency.

`\setfontstep` ⟨`*`⟩ `{`⟨*floating point expression*⟩`}`

Sets the font size by setting the font step to the result of computing the ⟨*floating point expression*⟩. Adding the optional star ⟨`*`⟩ instead sets the font step equal to the current font step + the result of computing the ⟨*floating point expression*⟩. Sets the font baselineskip equal to the new font size × the value of the key `baselineskip-size-ratio`.

Some exceptions:

- If the font step, rounded to 5 decimal places, equals the font step of any font size command from `\tiny` to `\Huge` (Table 1), then that font size command will be used directly.
- `\setfontstep` will issue an error if the font step is undefined (as explained for `\currentfontstep` in §3.2). The font step, rounded to 5 decimal places, must equal the font step of any font size command from `\tiny` to `\Huge` unless the value of the key `typographic-scale` is `musical`. When adding the optional star ⟨`*`⟩, the current font step must be defined.
- Does nothing, except issue a warning, if used in math mode.

`\setfontscale` ⟨`*`⟩ `{`⟨*floating point expression*⟩`}`

Sets the font size by setting the font scale to the result of computing the ⟨*floating point expression*⟩. Adding the optional star ⟨`*`⟩ instead sets the font scale equal to the current font scale + the result of computing the ⟨*floating point expression*⟩. Sets the font baselineskip equal to the new font size × the value of the key `baselineskip-size-ratio`. Does nothing, except issue a warning, if used in math mode.

`\setfontsize` ⟨`*`⟩ `{`⟨*dimen expression*⟩`}`

Sets the font size to the value of ⟨*dimen expression*⟩. Adding the optional star ⟨`*`⟩ instead sets the font size equal to the current font size + the result of ⟨*dimen expression*⟩. Sets the font baselineskip equal to the new font size × the value of the key `baselineskip-size-ratio`. Does nothing, except issue a warning, if used in math mode.

`\scalefont {`⟨*floating point expression*⟩`}`

Scales the font size and font baselineskip by a factor equal to the result of computing the ⟨*floating point expression*⟩. The new font baselineskip has no stretch and shrink components. Does nothing, except issue a warning, if used in math mode. This command is intended as a more robust alternative to `\scalefont` from the scalefnt package.

`\setfontsizebaselineskip` {⟨*dimen expression*⟩} {⟨*skip expression*⟩}

Sets the font size and font baselineskip to the value of ⟨*dimen expression*⟩ and ⟨*skip expression*⟩, respectively. Does nothing, except issue a warning, if used in math mode. This command is intended as a more robust alternative to `\fontsize` + `\selectfont`.

3.4 Setting only the font baselineskip

`\setfontbaselineskip` ⟨***⟩ {⟨*skip expression*⟩}

Sets the font baselineskip to the value of ⟨*skip expression*⟩. Adding the optional star ⟨***⟩ instead sets the font baselineskip equal to the current font baselineskip + the result of ⟨*skip expression*⟩. Does not change the font size. Does nothing, except issue a warning, if used in math mode.

3.5 Testing and debugging

This subsection documents commands that are intended primarily for testing and debugging. I have used them often when developing this package so I think users will find them helpful.

`\printfontsizeparameters`

Prints the current font step, font scale, font size, and font baselineskip. The printed font step and font scale are rounded to 5 decimal places. To print with more decimal places, use `\currentfontstep` and `\currentfontscale` (§3.2). The printed font step will be left blank if it is undefined (as explained for `\currentfontstep` in §3.2).

`\printallfontsizeparameters`

Prints the font step, font scale, font size, and font baselineskip of each font size command from `\tiny` to `\Huge`. The printed font scale is rounded to 5 decimal places. To print with more decimal places, use `\currentfontscale` (§3.2). Cannot be used in math mode.

`\printsampletext` ⟨***⟩ {⟨*text*⟩}

Prints ⟨*text*⟩ in each font size ordered from `\tiny` to `\Huge` each followed by `\par`. ⟨*text*⟩ can contain `\par` tokens. Adding the optional star ⟨***⟩ reverses the order of the font sizes. Cannot be used in math mode. One useful way of printing sample text is:

`\printsampletext{\printfontsizecommand:␣\printfontsizeparameters}`

`\printfontsizecommand`

Tests if the current font size equals the font size of any font size command from `\tiny` to `\Huge`. If so, prints the name of that font size command. If not, prints "\undefined". Cannot be used in math mode.

4 Programming

This section documents the expl3 programming support provided by the fontscale package.

4.1 Compatibility with `\text_purify:n`

`\text_purify:n` will correctly remove the formatting commands defined by this package. This includes the commands documented in §3.1, §3.3, and §3.4.

4.2 Public functions and variables

This package does not define any public expl3 functions.

This package defines some public expl3 variables. They are set either by `\fontscalesetup` or in the `selectfont` hook. They should never be modified directly.

The syntax ⟨*font size command*⟩ represents the name of a font size command from `\tiny` to `\Huge`, omitting the backslash `\`.

`\c_fontscale_`⟨*font size command*⟩`_step_fp`
`\l_fontscale_`⟨*font size command*⟩`_scale_fp`
`\l_fontscale_`⟨*font size command*⟩`_size_dim`
`\l_fontscale_`⟨*font size command*⟩`_baselineskip_skip`

Stores the font step, font scale, font size, and font baselineskip of each font size command from `\tiny` to `\Huge`. Exception: `\l_fontscale_normalsize_scale_fp` is not defined. The font scale of `\normalsize` is stored in `\c_fontscale_normalsize_scale_fp`. The local variables are set by `\fontscalesetup`.

`\l_fontscale_step_fp`
`\l_fontscale_scale_fp`
`\l_fontscale_size_dim`
`\l_fontscale_baselineskip_skip`

Stores the current font step, font scale, font size, and font baselineskip, respectively. `\l_fontscale_step_fp` equals `\c_nan_fp` if the current font step is undefined (as explained for `\currentfontstep` in §3.2). These variables are set in the `selectfont` hook.