Fonts in LaTeX

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Abstract

This document presents a very brief overview of the topic of fonts in LaTeX. A quick introduction to some of the terminology is given, and various ways are shown to change fonts and different aspects of them to one's liking.

This document is in no way, shape or form exhaustive; the topic of fonts can fill (and has filled) entire books. But it should suffice for most day-to-day usage, and where it does not, provides some pointers to more in-depth resources.

Contents

1 Incomplete Summary For the Impatient

Switching to Default Document Font

```
\normalfont The quick brown fox jumps over the lazy dog.
```

The quick brown fox jumps over the lazy dog.

Changing Fonts between Roman, Sans Serif and Monospace

```
\rmfamily We shall start with roman, \sffamily continue with
sans serif, \ttfamily and end up at typewriter.
```

We shall start with roman, continue with sans serif, and end up at typewriter.

Writing a Piece of Text In Roman, Sans Serif and Monospace

```
\textrm{The quick brown fox jumps over the lazy dog.}
\textsf{The quick brown fox jumps over the lazy dog.}
\texttt{The quick brown fox jumps over the lazy dog.}
```

The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.

Writing a Piece of Text in Different Font Weights

```
\textbf{The quick brown fox jumps over the lazy dog.}
\textmd{The quick brown fox jumps over the lazy dog.}
```

The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.

Writing a Piece of Text in Different Font Shapes

```
\emph{The quick brown fox jumps over the lazy dog.}
\textit{The quick brown fox jumps over the lazy dog.}
\textsl{The quick brown fox jumps over the lazy dog.}
\textsc{The quick brown fox jumps over the lazy dog.}
\textup{The quick brown fox jumps over the lazy dog.}
```

The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.

2 Terminology: Font Families, Fonts and Glyphs

A *font family*, also referred to as a *typeface*, is a font or a set of fonts with common features and characteristics, comprising all the needed *glyphs*. A glyph, in this context, is a graphical representation of a character, which can be a letter, a logogram, a mathematical symbol or other things[1].

For example, Table 1 contains different glyphs (called allographs) of the letter Q.

Table 1: Allographs for the letter Q

Font	TEX Abbreviation	Glyph
Computer Modern (LATEX default)	`cmr`	Q
Latin Modern	`lmr`	Q
Johannes Kepler Roman	`jkp`	Q
Johannes Kepler Roman Light	`jkpl`	Q
Latin Modern Sans Serif	`lmss`	Q
Avant Garde	`pag`	Q
Computer Modern Typewriter	`cmtt`	Q
Zapf Chancery	`pzc`	Q

In general, font families which one tends to use in a reasonable document these days tend to be grouped into three main categories[2]:

Common Font Families

roman fonts (with serifs), for example Palatino
sans-serif fonts, for example Helvetica
`monospace fonts, for example Courier`

Often, font families provide fonts for roman, sans-serif and monospace fonts (also called typewriter fonts, particularly in the TEX world). In those cases, the metrics and aesthetics of these different fonts in the same font family have been tuned to look pleasing when used together. It is therefore often tricky to mix and match fonts from different font families without the result looking odd[3].

In LATEX, there are three macros which contain the default fonts families for the three font groups:

[1] Obviously typography is a vast and complex topic and there is no way I can do it true justice here. Even if I wanted to, I am most certainly no scholar on the topic. But for the purposes of this document this information shall suffice. The curious reader shall feel free to research the topic in more depth, if so desired.

[2] There are more, but these are unlikely to be useful in most practical applications these days. For more, see [1].

[3] Of course it can be done, but it is helpful to be aware of this general issue and to be careful when picking fonts from different families to be used together in the same document.

Default Font Families in LaTeX

```
\rmdefault
\sfdefault
\ttdefault
```

Furthermore, there is a command `\familydefault` which contains the currently configured default font family (one of the above three).

3 Selecting Fonts

Fundamentally, there are three mechanisms for selecting fonts: Firstly, *font declarations* and, secondly, their corresponding *commands*. Declarations change the font within the current scope, while the commands only typeset the content within their argument, delimited by `{` and `}`. Table 2 presents an overview the declarations, their equivalent commands and their effect.

Table 2: Font declarations and commands, and their effects

Declaration	Command	Effect
`\mdseries`	`\textmd{`*text*`}`	Medium Series
`\bfseries`	`\textbf{`*text*`}`	**Bold Series**
`\upshape`	`\textup{`*text*`}`	Upright Shape
`\itshape`	`\textit{`*text*`}`	*Italic Shape*
`\slshape`	`\textsl{`*text*`}`	*Slanted Shape*
`\scshape`	`\textsc{`*text*`}`	Small Caps Shape
`\scslshape`	`\textscsl{`*text*`}`	*Small Caps Slanted Shape*
`\rmfamily`	`\rmfamily{`*text*`}`	Roman Family
`\sffamily`	`\sffamily{`*text*`}`	Sans Serif Family
`\ttfamily`	`\ttfamily{`*text*`}`	`Typewriter Family`
`\normalfont`	`\normalfont{`*text*`}`	Default Document Font

Different fonts may or may not implement some or more of these options. For example, the *Small Caps Slanted* font variant is not supported by Computer Modern, but comes with the Kp-Fonts font family which has been chosen for this document.

The third mechanism is to set the four properties which are configurable for a font with the commands `\fontencoding`, `\fontfamily`, `\fontseries` and `\fontshape`, followed by `\selectfont` (not all of them need be set, of course; one may choose to only change the font family, for example). The `\selectfont` command tends to be used mostly for local font style changes which can't be covered by the macros from Table 2.

The \selectfont Command

```
\fontencoding{T1}
\fontfamily{pag}
```

The \selectfont Command (cont)

```
\fontseries{m}
\fontshape{it}
\selectfont
The quick brown fox jumps over the lazy dog.
```

The quick brown fox jumps over the lazy dog.

3.1 Font Packages

The most convenient way to choose the default fonts for a document is by using font packages. Once one or more font packages have been loaded, we can then switch among the defaults which have been defined by those packages with the commands from Table 2.

Good places to peruse for finding fonts are CTAN [3] and the LaTeX font catalogue [5]. A popular choice is the Latin Modern Package (`\usepackage{lmodern}`), which is an expansion of Computer Modern with better support for non-ASCII characters. For documents which are not in English, Latin Modern is a solid choice, provided one likes its aesthetics.

As a different example, if we wish to typeset our document in DejaVu, we can put `\usepackage{dejavu}` in the preamble. This will set `\rmdefault`, `\sfdefault` and `\ttdefault` to the corresponding values, while `\familydefault` will continue to point to the one of those three to which it was set previously (`\rmdefault` by default).

Not all font packages provide all kinds of font families, or all font families in all weights and shapes. Consult the documentation for the package which you're intending to use. In the cases where a package only provides some type of font, the others will be left unchanged and may be configured by using a font package specific to those fonts, or left at the Computer Modern default. For example, the `FiraSans` package, which is obviously a sans serif typeface, does not provide a roman font. Therefore, the serif fonts are left untouched by loading that package.

The same goes for mathematics: Not all fonts provide the needed symbols for typesetting mathematics.

A personal favorite of mine is the Kp-Fonts family [4]. It has roman, sans-serif and typewriter font choices (although personally I prefer the Computer Modern typewriter font and usually keep that intact), along with mathematics and many symbols. This is the setup which has been chosen for this document. But this is a matter of personal preference; one's mileage may vary.

3.2 Global Font Selection For a Document

One may wish to typeset a document in sans serif or typewriter. Besides using a package to do this, one may also manually configure the default document font in the preamble[4] like this:

[4] Or anywhere else in the document, for that matter. Whether or not that is a sensible thing to do is another question. One should usually not mix different fonts and font styles willy-nilly.

Defining the Default Font Families Manually

```
\renewcommand{\familydefault}{\rmdefault}
\renewcommand{\familydefault}{\sfdefault}
\renewcommand{\familydefault}{\ttdefault}
```

The first command will usually do nothing, of course, because the default family tends to be the roman font.

Note that typewriter fonts differ in what kinds of adjustments TEX usually makes when it comes to spacing in order to achieve a justified block of text. Also, words in typerwriter fonts will not hyphenate except in places where \- has been inserted manually. This is also why sometimes a monospaced piece of text can protrude outside the right textblock margin when you put it in normal text (see above with the dejavu example; that was not done on purpose). More on the topic can be found in [2].

Combining different font families can be done in the same manner. This allows to compose a custom set of default fonts for a document which might not be covered by a font package. As mentioned, care should be taken to pick fonts which go nicely together. For example, selecting Palatino as the roman default font, Helvetica as the default sans-serif font and Latin Modern as the typewriter font could be done by putting these commands in the preamble:

Creating a Custom Set of Default Fonts

```
\renewcommand{\rmdefault}{ppl}  % Palatino
\renewcommand{\sfdefault}{phv}  % Helvetica
\renewcommand{\ttdefault}{lmtt} % Latin Modern
```

Changing math fonts is rather more complex. I recommend not doing that manually, but instead relying on font packages instead, as described in the previous section. See for example [6] and [7]).

3.3 Local Font Selection From Defined Defaults

There are two basic scenarios for locally changing fonts: Selecting a different font, series or shape from the defined default font families which are already loaded, or selecting a completely different font which has not yet been loaded into the document. This section deals with the former scenario; for the latter, see the next section.

Locally changing font properties or families among the choices already loaded can be done with the declarations and commands listed in Table 2.

Local Font Changing Among Loaded Fonts and Styles

```
\bfseries This text is in bold, while \mdseries this text is
in normal weight. \slshape We continue with the slanted
shape, followed by the \scshape small capitals shape,
followed by the \itshape italic shape. \normalfont and now
```

►

Local Font Changing Among Loaded Fonts and Styles (cont)

```
we are back to the  default document font, whatever that may
be.

{\scslshape For keeping font  declaration effects local}, we
must enclose  the declaration and  the text which  it should
affect inside a scope.
```

This text is in bold, while this text is in normal weight. *We continue with the slanted shape, followed by the* SMALL CAPITALS SHAPE, FOLLOWED BY THE *italic shape*. And now we are back to the default document font, whatever that may be.

FOR KEEPING FONT DECLARATION EFFECTS LOCAL, we must enclose the declaration and the text which it should affect inside a scope.

Or with font commands:

Local Font Changing Among Loaded Fonts and Styles

```
\textbf{This text is in bold, while} \textmd{this text is in
normal weight}. \textsl{We continue  with the slanted shape,
followed by the } \textsc{ small capitals shape, followed by
the  }\textit{italic  shape.} And now  we  are  back to  the
default document font, whatever that may be.
```

This text is in bold, while this text is in normal weight. *We continue with the slanted shape, followed by the* SMALL CAPITALS SHAPE, FOLLOWED BY THE *italic shape*. And now we are back to the default document font, whatever that may be.

3.4 Local Font Selection From Non-Defaults

If we wish to load a completely different font which has not already been loaded (be that because we did not want it to be the document default, or because there simply does not exist a package for it), we can use the `\selectfont` command and its friends.

Switching to a Non-Default Font

For example, if we wish to switch to Helvetica:

```
\fontfamily{phv}\selectfont
```

And now we should have Helvetica for this text. The font family will stay Helvetica until it is switched back with one of these two commands (or changed to anything else with the appropriate command, should one so choose):

```
\fontfamily{\familydefault}\selectfont
```

Switching to a Non-Default Font (cont)

or

```
\normalfont
```

And now we're back to Kp-Fonts serif.

The same scope rules which we've already seen apply here as well:

Selecting Arbitrary Font Families Locally

```
{\fontfamily{phv}\selectfont This text is in Helvetica!}
While this text is not!
```

This text is in Helvetica! While this text is not!

4 Font Properties

We will now look at changing various properties for a font: Its size, its series (weight) and its shape. For a nice explanation of this, see [9].

4.1 Font Sizes

By default, LaTeX offers the following font sizes, which, depending on the global document font size set in the preamble (for example, with `\documentclass[11pt]{article}`), vary in the size which they will have on the page:

Size	Standard Classes and beamer			AMS Classes and memoir		
`\tiny`	5	6	6	6	7	8
`\scriptsize`	7	8	8	7	8	9
`\footnotesize`	8	9	10	8	9	10
`\small`	9	10	10.95	9	10	10.95
`\normalsize`	10	10.95	12	10	10.95	12
`\large`	12	12	14.4	10.95	12	14.4
`\Large`	14.4	14.4	17.28	12	14.4	17.28
`\LARGE`	17.28	17.28	20.74	14.4	17.28	20.74
`\huge`	20.74	20.74	24.88	17.28	20.74	24.88
`\Huge`	24.88	24.88	24.88	20.74	24.88	24.88

The table has been taken from [10].

Yet again, these commands change the font size within the current scope, so should usually be enclosed in braces:

Locally Changing Font Sizes

```
{\LARGE This is a piece of large text.} And this is of normal size again.
```

{\LARGE This is a piece of large text.} And this is of normal size again.

4.2 Font Series

Changing font weights can be done either via a `\fontseries{<argument>}` command, followed by `\selectfont`, or via the `\bfseries`, `\mdseries` and `\lfseries` declarations listed in Table 2, respectively. A font may offer more than three weights, in which case one might need to resort to the `\fontseries` command for changing fonts because the corresponding `\..series` declaration does not exist.

Furthermore, depending on which option is loaded if one is using a font package such as Kp-Fonts, the default font weight and all others will be changed accordingly among `\bfseries` and its friends. For example, this happens when one selects the `\light` option for Kp-Fonts package. For specifics, consult the documentation for the package you're using.

Lastly, note that not all options might be supported by all fonts (for example, Kp-Fonts with a `light` option shows vehement displeasure at being instructed to execute `\lfseries`). With Kp-Fonts in the configuration for this document, these are the options available:

Locally Changing Font Weight

```
{\fontseries{l}\selectfont  The quick brown fox jumps over the lazy dog.}
{\fontseries{m}\selectfont  The quick brown fox jumps over the lazy dog.}
{\fontseries{sb}\selectfont The quick brown fox jumps over the lazy dog.}
{\fontseries{b}\selectfont  The quick brown fox jumps over the lazy dog.}
{\fontseries{bx}\selectfont The quick brown fox jumps over the lazy dog.}

{\mdseries\selectfont The quick brown fox jumps over the lazy dog.}
{\bfseries\selectfont The quick brown fox jumps over the lazy dog.}

\textbf{The quick brown fox jumps over the lazy dog.}
\textmd{The quick brown fox jumps over the lazy dog.}
```

{\fontseries{l}\selectfont The quick brown fox jumps over the lazy dog.}
{\fontseries{m}\selectfont The quick brown fox jumps over the lazy dog.}
{\fontseries{sb}\selectfont The quick brown fox jumps over the lazy dog.}
{\fontseries{b}\selectfont The quick brown fox jumps over the lazy dog.}
{\fontseries{bx}\selectfont The quick brown fox jumps over the lazy dog.}

{\mdseries\selectfont The quick brown fox jumps over the lazy dog.}
{\bfseries\selectfont The quick brown fox jumps over the lazy dog.}

\textbf{The quick brown fox jumps over the lazy dog.}
\textmd{The quick brown fox jumps over the lazy dog.}

Locally Changing Font Weight (cont)

The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.

4.3 Font Shapes

Selecting the font shape can be done via the `\fontshape{<argument>}` command, followed by `\selectfont`, by a corresponding font declaration, or, by the corresponding `\text..{}` command (see Table 2). Again, the number of font shapes and possible combinations thereof will vary depending on the font being used. Kp-Fonts supports these options:

Locally Changing Font Shapes

```
{\fontshape{sc}\selectfont The quick brown fox jumps over the lazy dog.}
{\fontshape{scsl}\selectfont The quick brown fox jumps over the lazy dog.}
{\fontshape{it}\selectfont The quick brown fox jumps over the lazy dog.}
{\otherscshape\selectfont The quick brown fox jumps over the lazy dog.}
{\otherscslshape\selectfont The quick brown fox jumps over the lazy dog.}

{\upshape The quick brown fox jumps over the lazy dog.}
{\itshape The quick brown fox jumps over the lazy dog.}
{\slshape The quick brown fox jumps over the lazy dog.}
{\scshape The quick brown fox jumps over the lazy dog.}
{\scslshape The quick brown fox jumps over the lazy dog.}

\textup{The quick brown fox jumps over the lazy dog.}
\textit{The quick brown fox jumps over the lazy dog.}
\textsl{The quick brown fox jumps over the lazy dog.}
\textsc{The quick brown fox jumps over the lazy dog.}
\textscsl{The quick brown fox jumps over the lazy dog.}
```

The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.

The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.

The quick brown fox jumps over the lazy dog.
The quick brown fox jumps over the lazy dog.

Locally Changing Font Shapes (cont)

The quick brown fox jumps over the lazy dog.
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.

4.4 Combinations

The commands presented above can be combined in various ways, depending, again, on the font families being used. Some fonts will support different combinations than others.

Combining Different Font Styles

```
The quick brown fox jumps over the lazy dog.
{\fontshape{sc}\fontseries{b}\selectfont
The quick brown fox jumps over the lazy dog.}
{\fontshape{it}\fontseries{b}\selectfont
The quick brown fox jumps over the lazy dog.}
```

The quick brown fox jumps over the lazy dog.
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.
The quick brown fox jumps over the lazy dog.

4.5 Emphasis

The `\emph` command is a context-aware way to highlight text. It will select an appropriate font version automatically to achieve this goal. Usually, `\emph` uses italics, but when it is placed inside italic text, it will switch to an upright font shape.

Emphasis

```
{\fontshape{u}\selectfont This sentence \emph{emphasizes} a word of itself.}
{\fontshape{it}\selectfont This sentence \emph{emphasizes} a word of itself.}
Here, again, there exists an {\em alternative} version.
{\itshape Here, again, there exists an {\em alternative} version.}
```

This sentence *emphasizes* a word of itself.
This sentence emphasizes *a word of itself*.
Here, again, there exists an *alternative* version.
Here, again, there exists an alternative *version*.

References

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