Fonts for Displaying Program Code in LaTeX

Adrian P. Robson

nepsweb.co.uk

8 October 2012

1 Introduction

Here we look at fonts for printing program code in LaTeX documents. Suitable fonts are monospaced; have good glyphs for the special character used in program code; and have no confusing similarities between character glyphs. The fonts must also be simple to set as the default typewriter font, so they are easy to use in LaTeX verbatim environments.

The following discussion is based on the typewriter fonts listed in The LaTeX Font Catalogue (`www.tug.dk/FontCatalogue`), and the examples work with MikTex and TeXlive installations.

2 Monospaced Fonts

The following are the monospaced fonts that are easily available and can be simply used in verbatim environments. They are shown here at their normal size, with the `upquotes` package.

Computer Modern Typewriter

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

Latin Modern Typewriter

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

TXTT

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

Bera Mono

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

DejaVu Sans Mono

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

Courier

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

TeX Gyre Cursor

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

KP Monospaced

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

LuxiMono

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$'"
```

Inconsolata

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz
1234567890    (a){a}[a]    -+*/ %^ =<>!&|~ ;:_#@$"
```

3   Computer and Latin Modern Fonts

The Computer Modern Fonts are the LaTeX default, so no action is needed to use its typewriter family. It is generally very good for program listings, but its tilde is too high and its minus too low, as this shows: `+-~x`. It has a plain zero.

The Latin Modern family of fonts is almost the same as Computer Modern but its typewriter font has a lower tilde and higher minus: `+-~x`.

3.1   Using Latin Modern Typewriter

If the Latin Modern Typewriter font is wanted, it is best to adopt the whole family with

```
\usepackage{lmodern}
\usepackage[T1]{fontenc}
```

4   TXTT Font

This font is similar to Computer Modern, but it is generally a little bolder, and has a single story `g` glyph. It has a centrally aligned tilde `~` and a crossed zero `0`. However, its asterisk glyph `*` is poor and set too high.

To use it, simply make `TXTT` the default typewriter font:

```
\renewcommand*\ttdefault{txtt}
```

5 Bera and DejaVu Fonts

Bera Mono and DejaVu Sans Mono fonts are almost identical[1] at the same scale, but the DejaVu asterisk glyph * is higher than Bera's *. At default scale values, DejaVu is slightly larger than Bera. The fonts are sans serif. They have a single story g glyph, a centrally aligned tilde ~, and a dotted zero 0.

5.1 Using Bera Mono

To use Bera Mono as the default typewriter font, put the following in the preamble:

```
\usepackage[scaled]{beramono}
\usepackage[T1]{fontenc}
```

If only occasional use of the font is needed then put this is the preamble after the main font families have been selected:

```
\edef\oldtt{\ttdefault}
\usepackage[scaled]{beramono}
\usepackage[T1]{fontenc}
\renewcommand*\ttdefault{\oldtt}
\newcommand{\bera}[1]{{\fontfamily{fvm}\selectfont #1}}
```

This retains the existing typewriter font, and allows the following to to used to invoke Bera when needed:

```
\bera{XDF-HJU-0D4-S2E}
```

5.2 Using DejaVu Sans Mono

To use DejaVu Sans Mono as the default typewriter font, put the following in the preamble:

```
\usepackage[scaled]{DejaVuSansMono}
\usepackage[T1]{fontenc}
```

6 Courier and TeX Gyre Cursor Fonts

Courier and TeX Gyre Cursor are almost identical[2], but the Courier asterisk glyph * is lower than Gyre's *. The fonts are lighter and larger than Computer Modern. They have a single story g glyph, a centrally aligned tilde ~, and a plain zero.

6.1 Using Courier

To use Courier as the default typewriter font, put the following in the preamble:

```
\usepackage{courier}
\usepackage[T1]{fontenc}
```

---

[1]DejaVu and Bera fonts are both derived from the Bitstream Vera fonts.
[2]The font that is actually provided for Courier is URW Nimbus Mono. The TeX Gyre Cursor font is an enhanced version of this.

6.2 Using TeX Gyre Cursor

To use TeX Gyre Cursor as the default typewriter font, put the following in the preamble:

```
\usepackage{tgcursor}
\usepackage[T1]{fontenc}
```

7 KP Monospaced

KP Monospaced is sans serif with a plain zero. Its special characters are well balanced: *+-~x, but its zero and capital O are very similar: 00.

It is part of a font family with roman, sans-serif and monospaced shapes.[3] To adopt just its monospaced font, include this in the document preamble:

```
\usepackage[T1]{fontenc}
\renewcommand*\ttdefault{jkptt}
```

8 LuxiMono

LuxiMono is a rather heavy and large serif font with a plain zero. Its special characters are well balanced: *+-~x, but its zero and capital O glyphs are very similar: 00.

To use it as the default typewriter font, put the following in the document's preamble:

```
\usepackage[T1]{fontenc}
\renewcommand*\ttdefault{ul9}
```

9 Inconsolata Font

This could be a nice programming font[4], but it does not work with the `upquotes` package. It should also have a crossed zero but this is not the default in its LaTeX implementation (See below). Nevertheless, the Inconsolata font can be made the default typewriter font with

```
\usepackage{inconsolata}
```

or it can be invoked explicitly with

```
\newcommand{\textincon}[1]{%
{\fontfamily{fi4}\selectfont #1}}
...
\textincon{This is Inconsolata text}
```

---

[3]The KP Fonts Serif family of fonts is based on the URW Palladio fonts. The mathematics fonts include all the AMS fonts, in both normal and bold weights.

[4]Inconsolata was inspired by Microsoft's Consolas font

9.1 Crossed Zeros with Inconsolata

The Inconsolata font is advertised as having a crossed zero, but its version in MikTeX and TexLive does not have this feature. Nevertheless, a slashed zero can be obtained by defining a new command:

```
\usepackage[EI1,T1]{fontenc}
...
\newcommand{\slashzero}{{%
\fontencoding{EI1}\selectfont \char9}}
```

This uses the `EI1` encoding, and to make this work with MikTex or TexLive installations a `ei1enc.def` file has to be provided. Appendix E gives a minimal implementation of a suitable definition file.

Once all this is done, the `\slashzero` command can be used as follows:

```
\textincon{\slashzero 123456789}
```

which gives `0123456789`. Unfortunately, this method only works for explicit invocation, and will not work for verbatim environments.

10 Conclusions and Recommendations

We can reach the following conclusions:

- Do not use Inconsolata because it does not work with the `upquote` package.

- Do not use TXTT for program code because of its bad asterisk. However, its crossed zero can work well for passwords and the like.

- Do not use KP Monospaced because its zero and upper case O are too similar.

- Do not use LuxiMono because its zero and upper case O are too similar.

- Use Latin Modern instead of Computer Modern because its minus and title are better aligned.

- Use Bera Mono instead of DejaVu Sans Mono because it has a better asterisk.

- Use Courier instead of TeX Gyre Cursor because it has a better asterisk.

In summary, for program code in LaTeX documents:

Marked Zero: Bera Mono

Plain Zero: Latin Modern Typewriter or Courier

>Which of these plain zero fonts is best is mainly a matter of taste. But if the general font family would have been Computer Modern, then Latin Modern Typewriter is an obvious choice.

A Name Comparison

Computer Modern	`count01`	`allDone`	`MAX_VALUE`
Latin Modern	`count01`	`allDone`	`MAX_VALUE`
TXTT	`count01`	`allDone`	`MAX_VALUE`
Bera Mono	`count01`	`allDone`	`MAX_VALUE`
KP Monospaced	`count01`	`allDone`	`MAX_VALUE`
Courier	`count01`	`allDone`	`MAX_VALUE`
TeX Gyre Cursor	`count01`	`allDone`	`MAX_VALUE`
LuxiMono	`count01`	`allDone`	`MAX_VALUE`

B Symbol Comparison

Computer Modern	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`
Latin Modern	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`
TXTT	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`
Bera Mono	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`
DejaVu Sans Mono	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`
KP Monospaced	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`
Courier	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`
TeX Gyre Cursor	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`
LuxiMono	`x~+-*/%`	`-><<=!&|^`	`apr@neps.co.uk`

C Confusable Characters

Computer Modern Teletype	`Z2`	`lI1`	`S5`	`O0`
TXTT	`Z2`	`lI1`	`S5`	`O0`
Bera Mono	`Z2`	`lI1`	`S5`	`O0`
KP Monospaced	`Z2`	`lI1`	`S5`	`O0`
Courier	`Z2`	`lI1`	`S5`	`O0`
LuxiMono	`Z2`	`lI1`	`S5`	`O0`
Inconsolata	`Z2`	`lI1`	`S5`	`O0`

D Sample Code

D.1 Latin Modern Typewriter

```
/* This does not make algorithmic sense, but it shows off
 *  significant programming characters.  */

#include<stdio.h>

void myFunction( int input, float* output ) {
   switch ( array[i] ) {
      case 1: // This is silly code
         if ( a >= 0 || b <= 3 && c != x )
            *output += 0.005 + 20050;
         char = 'g';
         b = 2^n + ~right_size - leftSize * MAX_SIZE;
         c = (--aaa + &daa) / (bbb++ - ccc % 2 );
         strcpy(a,"hello $@?");
   }
   count = ~mask | 0x00FF00AA;
}
```

D.2 Bera Mono

```
/* This does not make algorithmic sense, but it shows off
 *  significant programming characters.  */

#include<stdio.h>

void myFunction( int input, float* output ) {
   switch ( array[i] ) {
      case 1: // This is silly code
         if ( a >= 0 || b <= 3 && c != x )
            *output += 0.005 + 20050;
         char = 'g';
         b = 2^n + ~right_size - leftSize * MAX_SIZE;
         c = (--aaa + &daa) / (bbb++ - ccc % 2 );
         strcpy(a,"hello $@?");
   }
   count = ~mask | 0x00FF00AA;
}
```

D.3 Courier

```
/* This does not make algorithmic sense, but it shows off
 *  significant programming characters.  */

#include<stdio.h>

void myFunction( int input, float* output ) {
   switch ( array[i] ) {
      case 1: // This is silly code
         if ( a >= 0 || b <= 3 && c != x )
            *output += 0.005 + 20050;
         char = 'g';
         b = 2^n + ~right_size - leftSize * MAX_SIZE;
         c = (--aaa + &daa) / (bbb++ - ccc % 2 );
         strcpy(a,"hello $@?");
   }
   count = ~mask | 0x00FF00AA;
}
```

E   Encoding Definition File for Inconsolata

This is the `EI1` encoding file needed for crossed zeros in Inconsolata (See section 9.1). It should be called `ei1enc.def`, and put in the same folder as the LATEX document:

```
\ProvidesFile{ei1enc.def}
\DeclareFontEncoding{EI1}{}{}
\DeclareFontSubstitution{EI1}{fi4}{m}{n}
```

Details of the commands used in this file can be found in 'LATEX2e font selection' at `www.latex-project.org/guides/fntguide.pdf`.