Glisterings: Lining up

Peter Wilson

> The lines are fallen unto me in pleasant places; yea, I have a goodly heritage.
>
> *The Bible, Psalm 16, v. 6*

The aim of this column is to provide odd hints or small pieces of code that might help in solving a problem or two while hopefully not making things worse through any errors of mine. This installment presents some items about lining things up.

1 Ruling off

Pujo wrote that he wanted to create a box with a line at the top and bottom but found that the fancybox package [10] only supplied boxes with all four sides enclosed. Peter Flynn [5] responded with the following, based on fancybox:

```
\documentclass{article}
\usepackage{fancybox,lipsum}
\newenvironment{ruledbox}{%
  \begin{Sbox}
    \begin{minipage}{\columnwidth}{%
  \end{minipage}\end{Sbox}%
  \centering\medskip
  \vbox{\hrule height1pt
    \par\medskip
    \TheSbox
    \medskip\hrule height1pt}\par\medskip}
\begin{document}
\lipsum[1]

\begin{ruledbox}
\lipsum[2]
\end{ruledbox}
\lipsum[1]
\end{document}
```

Sometime later I wondered if a box was really needed, wouldn't just drawing a couple of rules do as well? I came up with the ruled environment which let you change the width of the ruled contents.

```
\newdimen\narrowsize
\newenvironment{ruled}[1][0pt]{%
  \par
  \narrowsize\hsize
  \advance\leftskip#1\advance\rightskip#1
  \advance\narrowsize-2\leftskip
  \noindent%
  \rule{\narrowsize}{3pt}\par
}{%
  \par\noindent
  \rule{\narrowsize}{1pt}
  \par}
```

The optional length argument to the environment is the distance the left and right margins should be increased, thus temporarily reducing the apparent width of the textblock. The next paragraph is set within

```
\begin{ruled}[1pc] ... \end{ruled}
```

> The ruled environment produces a result that might be a little too fancy for your taste, in which case change the thickness of the rules.

On the other hand, a box will not break across a page boundary which may be an advantage, but on the whole I think not.

2 Marginal rules

David Arnold posed the following problem on ctt.

I'd like to adjust my example environment in the code below so that each example is bracketed between two horizontal rules. The first rule should be placed above the example, align with the inner edge of the text and flow to the outer edge of the text, add a couple of spaces in the outer margin, typeset 'You Try It!', then continue to flow to within 1cm of the page edge.

Similarly, for the rule at the bottom of the example, I'd like to start it at the inner edge of the text, flow into the outer margin, then typeset the square that is flush right within 1cm of the paper edge.

I'm not showing David's code here. Instead, the below is effectively the code that I responded with [9]. Drawing the rules across the textblock is no problem. Also typesetting in the margins can be catered for by using the \rlap and \llap macros, thus avoiding LaTeX getting huffy about overlong lines. The only tedious part of the code is calculating the length of the two rules in the margin area. Hopefully the comments in the code explain sufficiently what is done in this regard.

```
\documentclass[twoside]{report}
\usepackage{lipsum}
\usepackage{amssymb}

\newcounter{example}[section]
\renewcommand{\theexample}{\arabic{example}}

%% insert lengths
\newdimen\uwidth
\newcommand*{\Utryit}{%
  \space\space You Try It!\space}
\settowidth{\uwidth}{\Utryit}
\newdimen\sqwidth
\newcommand*{\Usq}{{\Large$\square$}}
\settowidth{\sqwidth}{\Usq}
```

```
%% rule length in the oddpage margins =
%% paperwidth - textwidth - 1cm - 1in
%% - oddmargin - insert
% odd page rule lengths
\newdimen\uxtra  % Utryit
\newdimen\sqxtra % Square
\uxtra=\paperwidth
\advance\uxtra-\textwidth
\advance\uxtra-1cm
\advance\uxtra-1in
\advance\uxtra-\oddsidemargin
\sqxtra=\uxtra
\advance\uxtra-\uwidth
\advance\sqxtra\sqwidth

%% rule length in the evenpage margins =
%% 1in + evenmargin - 1cm - insert
\newdimen\uxtrav  % Utryit
\newdimen\sqxtrav % Square
\uxtrav=\evensidemargin
\advance\uxtrav 1in
\advance\uxtrav-1cm
\sqxtrav=\uxtrav
\advance\uxtrav-\uwidth
\advance\sqxtrav-\sqwidth

\makeatletter
\newenvironment{example}{%
\medskip\refstepcounter{example}%
\ifodd\c@page%     odd page
  \noindent\rule{\hsize}{3pt}%
    \rlap{\Utryit\rule{\uxtra}{3pt}}
\else
  \noindent\llap{\rule{\uxtrav}{3pt}\Utryit}%
    \rule{\hsize}{3pt}
\fi
\par\noindent\textbf{Example \theexample.}}%
{%
\ifodd\c@page
  \par\noindent\rule{\hsize}{1pt}%
  \rlap{\rule{\sqxtra}{1pt}
  \Usq}
\else
  \par\noindent\llap{\Usq\rule{\sqxtrav}{1pt}}%
    \rule{\hsize}{1pt}
\fi
  \par\medskip}
\makeatother

\begin{document}
\lipsum[1]
\begin{example}
\marginpar{Simplify: $33+28$}
\lipsum[2]
\end{example}
\lipsum[1]
\end{document}
```

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The code just shown is intended for use in single column documents, and as *TUGboat* uses two columns it will not work here (account must be taken of which column the example is in). Extending it to cater for two columns is left as an exercise.

3   Preventing an awkward page break

Szabolcs Horvát requested help on `ctt`:

I would like to have an environment that starts and ends with a horizontal line (`\hrule`), with text in smaller type in between. The text may run several pages long. How can it be prevented that the page be broken right after the first `\hrule` or right before the last one?

As so often happens Donald Arseneau came up with an answer [1].

The answer to the question is easy: insert `\par` and `\nobreak` and `\@nobreaktrue`.

The tricky problem is getting the spacing right! `\hrule` *causes normal* `\baselineskip` *to be omitted, but* `\rule` *takes a full baseline which leaves too much whitespace. Try this:*

```
\makeatletter
\newenvironment{aside}{%
  \list{}{\leftmargin 5ex
        \rightmargin\leftmargin}
  \vtop{\hrule width\columnwidth}%
  \nobreak\@nobreaktrue
  \vspace{0.5ex}%
  \item\relax\small
}{%
  \par\nobreak\@nobreaktrue
  \advance\baselineskip -0.7ex
  \vtop{\hrule width\columnwidth}%
  \endlist}
\makeatother
```

I tried the `aside` environment and it worked even better than requested as it kept a rule and at least two lines of text together.

I haven't tried to combine the `aside` and `ruled` environments which I leave as an interesting exercise.

From a slightly different viewpoint, Nick Urbanik posted to `ctt` that he wanted to keep a list of items always on a single page [8]. In particular, to keep a question and its suggested answers together, where there was a list of questions each with its list of answers. There were some six respondents to Nick's request for help but the discussion for some reason veered from the `enumitem` package to the `titlesec` package that had no relevance to the initial posting. Donald Arseneau again provided a simple solution to the original problem [3], resulting in questions and answers for a possible accountant's interview being coded like:

```
\textbf{Accountancy test}
\begin{questions}
\Qitem What is $2+2$?
  \begin{enumerate}
  \item 3
  \item 4
  \item Whatever you want it to be.
  \end{enumerate}
\Qitem What is the essence of double-entry
      bookkeeping?
  \begin{enumerate}
  \item Each transaction recorded twice,
        in the credit and debit ledgers.
  \item Two sets of books, the real ones and
        the ones for the tax inspectors.
  \item Don't know.
  \end{enumerate}
\Qitem What ...
\end{questions}
```

When processed this will result in a question and all its potential answers being kept together on a page and, depending on their length, there may be several sets of questions and answers on a page.

Accountancy test

1. What is $2 + 2$?
   (a) 3
   (b) 4
   (c) Whatever you want it to be.

2. What is the essence of double-entry bookkeeping?
   (a) Each transaction recorded twice, in both the credit and debit ledgers.
   (b) Two sets of books, the real ones and the ones for the tax inspectors.
   (c) Don't know.

3. What ...

Donald's method to make this happen is:

```
\newcommand*{\Qitem}{\pagebreak[0]\item}
\newenvironment{questions}%
  {\enumerate\samepage}%
  {\endenumerate}
```

which says that the `questions` environment should be all on one page except that a pagebreak is allowed just before a question's `\Qitem`.

4   Not at a page break

Sometimes it may be desirable to have a divisional marker of some kind disappear at a page break. I have forgotten the details but someone once had a supplement (with a title such as 'Notes') at the end of each chapter in the document and wanted to have a rule before the supplement unless the supplement started a new page.

———————————

A TeX *leader* is not a permissable breakpoint and may vanish at a page break and so provides a potential means of meeting such a requirement. Just before this paragraph I specified:

```
\newskip\rulebreakskip
  \rulebreakskip=\baselineskip
\newcommand*{\filler}{\hbox to \hsize{%
  \hss \rule{0.7\hsize}{1pt} \hss}\vskip 1pt}
\newcommand*{\rulebreak}{%
  \vskip\rulebreakskip
  \cleaders\filler
  \vskip\rulebreakskip}
\rulebreak
```

which resulted in either a centered rule or, if at the bottom of the column, nothing.

* * *

Just before this paragraph I specified:

```
\renewcommand*{\filler}{%
  \hbox to \hsize{\hss * * * \hss}}
\rulebreak
```

which resulted in either three centered asterisks or, if at the bottom of the column, nothing.

You can put different elements in the `\filler` box, such as an `\asterism` or a moustachio but you might have to adjust the value of `\rulebreakskip` for the best optical effect.

5   Line backing

'talazem' presented `ctt` with a problem that has never been completely solved in LaTeX — namely typesetting to a grid. TeX was not designed with this in mind. Slightly edited, his presentation was:

I am typesetting a book in Memoir and want to ensure that the lines register well to avoid shine through. The book is mainly in English with a font size 10/12.5. However there are some paragraphs that are causing alignment problems.

There are some paragraphs that have to be set to a 0.8 ratio of the primary face with a 0.5 ratio of line spacing. There are others in a non-English typeface where the font is about 1.4 times bigger than the Roman font for the English text.

Paragraphs of this kind throw off the alignment of text lines on adjacent pages, and causing shine through on the recto and verso sides of a page.

The basic requirement here is that these irregular paragraphs should take up a space that is an integral number of the normal `\baselineskip`.

The one potential solution provided came from an exchange of views between Donald Arseneau and Dan Luecking [4], as follows, where the environment will occupy an integral number of the normal lines.

```
\makeatletter
\@ifundefined{@tempdimc}{\newdimen\@tempdimc}{}
\newenvironment{gridblock}{\par
  \setbox\@tempboxa\vtop\bgroup
}{\par\egroup
% measurement of top
  \@tempdima=\ht\@tempboxa
  \@tempdimc=\dp\@tempboxa
  \ifdim\@tempdima>\ht\strutbox
    \advance\@tempdimc\@tempdima
    \@tempdima=\ht\strutbox
% \@tempdima is the top height.
    \advance\@tempdimc-\@tempdima
  \fi
% measurement of bottom
  \setbox\@tempboxa\vbox{\unvbox\@tempboxa}%
  \ifdim\dp\@tempboxa>\dp\strutbox
    \@tempdimb=\dp\strutbox
  \else
    \@tempdimb=\dp\@tempboxa
  \fi
% \@tempdimb is the bottom depth.
  \advance\@tempdimc-\@tempdimb
% \@tempdimc is distance between the top
% and bottom baselines.
% The excess, \@tempcnta, is the number
% of baselines.
  \@tempcnta=\@tempdimc
  \divide\@tempcnta\baselineskip
  \advance\@tempdimc -\@tempcnta\baselineskip
  \ifdim\@tempdimc >2\vfuzz
    \advance\@tempdimc-\baselineskip \fi
  \divide\@tempdimc\tw@
  \vbox to\@tempdima{}%
  \nobreak \nointerlineskip
    \kern-\@tempdima \kern-\@tempdimc \nobreak
  \box\@tempboxa
  \nobreak \nointerlineskip
    \kern-\@tempdimb \kern-\@tempdimc \nobreak
  \hbox{\vrule
    height \z@ width \z@ depth \@tempdimb}}
\makeatother
```

The `gridblock` environment doesn't cater for footnotes, floats, or really anything other than plain text. It certainly does *not* handle page breaks.

<small>This is \tiny text in the gridblock environment. I'm not sure how well the effect will be demonstrated as the adjacent column may, or may not, be evenly spaced vertically.</small>

Did that work out? Are the lines in this paragraph aligned with those on the adjacent columns, or pages? If not it may be because the adjacent columns are not set on a grid. Incidentally, the relatively recent package `grid` may be of interest, though it is not a complete solution either.

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6   Linespacing

Pander wrote [7]:

I have some questions on line spacing (leading) that should respect font size. It mainly concerns non-uniform line spacing that doesn't reserve space for ascenders and descenders and line spacing that is too big or too small for small and large font sizes.

Please see the following TeX [code] for the exact questions. I know this is tricky in TeX, but have to ask any way.

```
\noindent
{\tiny aeou\\aeou\\}%too much leading
{\normalsize aeou\\aeou\\}
{\Huge aeou\\aeou\\}%not enough leading
{\tiny gpqy\\gpqy\\}%too much leading
{\normalsize gpqy\\gpqy\\}
{\Huge gpqy\\gpqy\\}%no space for descenders
{\tiny bdfhkl\\bdfhkl\\}%too much leading
{\normalsize bdfhkl\\bdfhkl\\}
{\Huge bdfhkl\\bdfhkl\\}%no space for ascenders
{\tiny gpqybdfhkl\\gpqybdfhkl\\}%too much leading
{\normalsize gpqybdfhkl\\gpqybdfhkl\\}
{\Huge gpqybdfhkl\\gpqybdfhkl\\}
```

The result of processing this is shown in the left side of Figure 1. Pander also noted a similar problem when using different fonts in a `tabular`.

There were several respondents all of whom noted that Pander's example consisted of a single paragraph within which the several font size changes were closed within groups. Further, that TeX takes the font size in effect at the end of a paragraph as applying throughout the paragraph, and hence that the leading is constant.

Donald Arseneau [2] replied with:
Set `\baselineskip=0pt` *or some small value*
Set `\lineskip=\lineskiplimit=` *desired space*

```
\baselineskip=8pt
\lineskip=4pt
\lineskiplimit=\lineskip
```

Then be aware that font-change commands reset `\baselineskip`, *so that font changes that span the end of a paragraph will go back to some larger* `\baselineskip`.

In `tabular` *put* `\strut` *in with all your variant fonts.*

Roughly speaking, the normal spacing between the baselines of text is `\baselineskip` but if the 'top' of a line is closer than `\lineskiplimit` to the bottom of the previous line then the spacing will be increased so that the top to bottom space is `\lineskip` [6, Ch. 12]. The results of applying Donald's settings are shown at the right of Figure 1.
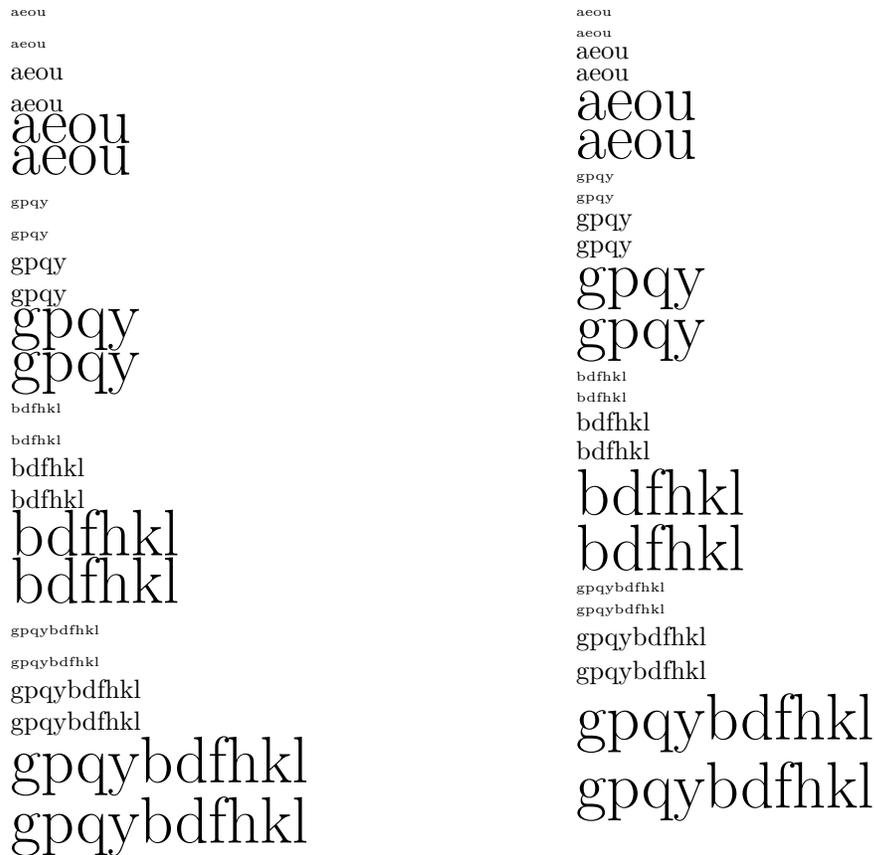
Figure 1: Different font sizes in a paragraph: (left) Pander's problem; (right) following Donald Arseneau

References

[1] Donald Arseneau. Re: Preventing page breaks at certain positions. Post to `comp.text.tex` newsgroup, 17 November 2009.

[2] Donald Arseneau. Re: Line spacing respecting space for ascenders / descenders and fontsize. Post to `comp.text.tex` newsgroup, 11 April 2011.

[3] Donald Arseneau. Re: List items always on the same page. Post to `comp.text.tex` newsgroup, 15 March 2011.

[4] Donald Arseneau and Dan Luecking. Re: vertical height of boxes by multiple of baselineskip. Post to `comp.text.tex` newsgroup, 9–10 December 2009.

[5] Peter Flynn. Re: Fancybox alternatives. Post to `comp.text.tex` newsgroup, 11 September 2009.

[6] Donald E. Knuth. *The TeXbook*. Addison-Wesley, 1984. ISBN 0-201-13448-9.

[7] Pander. Line spacing respecting space for ascenders / descenders and fontsize. Post to `comp.text.tex` newsgroup, 11 April 2011.

[8] Nick Urbanik. List items always on the same page. Post to `comp.text.tex` newsgroup, 13 March 2011.

[9] Peter Wilson. Re: Marginpar in memoir. Post to `comp.text.tex` newsgroup, 27 December 2009.

[10] Timothy Van Zandt. fancybox.sty: Box tips and tricks for LaTeX, September 2000. `http://ctan.org/pkg/fancybox`.

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