

Specifying Spaces, Lengths, and Boxes in \LaTeX

Michael S. Pukish

Electrical and Computer Engineering
Auburn University

July 7, 2010

Outline

- 1 Scope
- 2 Horizontal Spacing Control
 - `hspace{}` and `hspace*{}`
 - Font Size and `hspace{}`
 - `hspace{}` and `stretch{}`, `hfill`
- 3 Vertical Spacing Control
 - `vspace{}` and `vspace*{}`
 - `vspace{}` and `stretch{}`, `vfill`
 - Other vertical spacers
- 4 Boxes
 - What are Boxes ?
 - `parbox{}` and `minipage`
 - `makebox{}` and `mbox`
 - `framebox{}` and `fbox`
 - Example so far
 - `raisebox{}`
- 5 Further Study On Your Own
- 6 Conclusion

Scope

This presentation covers \LaTeX spaces, lengths, and boxes as these elements apply to inline text structure of documents. These concepts apply to many areas of \LaTeX . For clarification, this presentation will not cover the application of spaces, lengths, and boxes as they apply to:

- equations
- graphics
- figures
- etc.

Outline

- 1 Scope
- 2 Horizontal Spacing Control
 - `hspace{}` and `hspace*{}`
 - Font Size and `hspace{}`
 - `hspace{}` and `stretch{}`, `hfill`
- 3 Vertical Spacing Control
 - `vspace{}` and `vspace*{}`
 - `vspace{}` and `stretch{}`, `vfill`
 - Other vertical spacers
- 4 Boxes
 - What are Boxes ?
 - `parbox{}` and `minipage`
 - `makebox{}` and `mbox`
 - `framebox{}` and `fbox`
 - Example so far
 - `raisebox{}`
- 5 Further Study On Your Own
- 6 Conclusion

Horizontal Spacing Control

`\hspace{}` and `\hspace*{}`

The standard `\hspace{length}` command will simply trigger a newline if it runs out of space:

```
One Two Three
Four
```

```
\hspace{.125in} One
\hspace{.125in} Two
\hspace{.125in} Three
\hspace{.45in} Four
```

But `\hspace*{length}` will enforce the specified space (within a paragraph):

```
One Two Three
Four
```

```
\hspace*{.125in} One
\hspace*{.125in} Two
\hspace*{.125in} Three
\hspace*{.45in} Four
```

Note: `\hspace{}` and `\hspace*{}` are equivalent at locations other than at the end of a line.

Horizontal Spacing Control

Font Size and `hspace{}`

When using horizontal space together with text, it may make sense to make the space adjust its size relative to the size of the current font. This can be done by using the text-relative units `em` and `ex`:

`big` `y`

`tin` `y`

```
{\Large}big\hspace{1em}y \\\
{\tiny}tin\hspace{1em}y
```

Horizontal Spacing Control

`hspace{}` and `stretch{}`, `hfill`

The command `\stretch{length}` , used in conjunction with the `\hspace{}` command, generates a special “rubber space” in which all the remaining space on a line is filled up:

x

x

`x \hspace{\stretch{1}} x`

The numeral argument does not have significance unless a succession of `\hspace{\stretch{}}` commands are issued on the same line. In this case, the numerals represent respective proportions of all `\stretch{}` commands issued on the same line:

a

b

c

`a \hspace{\stretch{1}} b`
`\hspace{\stretch{3}} c`

If only an evenly proportional spacing is needed between elements on a line, use the `\hfill` command such as:

pip

pop

bing

plop

`pip \hfill pop`
`\hfill bing \hfill plop`

Outline

- 1 Scope
- 2 Horizontal Spacing Control
 - `hspace{}` and `hspace*{}`
 - Font Size and `hspace{}`
 - `hspace{}` and `stretch{}`, `hfill`
- 3 Vertical Spacing Control
 - `vspace{}` and `vspace*{}`
 - `vspace{}` and `stretch{}`, `vfill`
 - Other vertical spacers
- 4 Boxes
 - What are Boxes ?
 - `parbox{}` and `minipage`
 - `makebox{}` and `mbox`
 - `framebox{}` and `fbox`
 - Example so far
 - `raisebox{}`
- 5 Further Study On Your Own
- 6 Conclusion

Vertical Spacing Control

`\vspace{}` and `\vspace*{}`

Logically following from `\hspace{}` and `\hspace*{}` (...), the commands `\vspace{length}` and `\vspace*{length}` operate not between lines *within* a paragraph, but on the vertical space *between* paragraphs themselves. These commands should normally be used between two empty lines. If the space should be preserved and spread across the bottom and top of successive pages, use the starred version of the command, `\vspace*{}`, instead of `\vspace{}`:

First paragraph: This produces ...

Second Paragraph: No effect.(document only!!)

Third Paragraph: But now we have what we want.

First paragraph: This produces
`\ldots \vspace{2ex}`

Second Paragraph: No effect.
(document only!!)

`\vspace{2ex}`

Third Paragraph: But now
we have what we want.

Vertical Spacing Control

`vspace{}` and `stretch{}`, `vfill`

The `\stretch{}` command can be used in conjunction with the `\vspace*{}`, and `\vspace{}` commands such as:

```
Hi! \vspace{stretch{1}} something \vspace{stretch{3}} else \pagebreak
```

...in order to define relative proportional vertical spacing on a page between structures similar to its use with the `\hspace{}` commands. Since an example would require an entire page top to bottom, one is not shown. Use your imagination.

If only an evenly proportional vertical spacing is needed between elements on a page, use the `\vfill` command similarly to usage of the `\hfill` command.

Vertical Spacing Control

Other vertical spacers

For custom spacing between lines within a paragraph, the ‘`\\[length]`’ command is the only way to go as in:

The next line is spaced 10pt
below this one

Here it is.

The next line is spaced 10pt
below this one `\\[10pt]`
Here it is.

The `\bigskip`, `\medskip`, and `\smallskip` commands can be used as alternative vertical line spacers within a paragraph if an exact spacing is not required.

Outline

- 1 Scope
- 2 Horizontal Spacing Control
 - `hspace{}` and `hspace*{}`
 - Font Size and `hspace{}`
 - `hspace{}` and `stretch{}`, `hfill`
- 3 Vertical Spacing Control
 - `vspace{}` and `vspace*{}`
 - `vspace{}` and `stretch{}`, `vfill`
 - Other vertical spacers
- 4 **Boxes**
 - What are Boxes ?
 - `parbox{}` and `minipage`
 - `makebox{}` and `mbox`
 - `framebox{}` and `fbox`
 - Example so far
 - `raisebox{}`
- 5 Further Study On Your Own
- 6 Conclusion

Boxes

What are Boxes ?

The underlying structure of \LaTeX basically typsets all letters, words, sentences, paragraphs, figures, tables, etc., into “boxes”. Multiple of these elements on a page are then further grouped into enclosing “boxes”. We can manipulate and emphasize these boxes in various ways.

Boxes

parbox{} and minipage

The

`\parbox[pos]{width}{text}` and `\begin{minipage}[pos]{width}text \end{minipage}` commands can place a paragraph within a box. The ‘minipage’ method is more powerful as far as what you can do within a box. You can explore that on your own.

As an example:

Here is a basic box around a paragraph. We have set a reasonable width relative to `textwidth`, and the text is centered vertically. Note that the ‘pos’ variable can be either ‘t’, ‘b’, or ‘c’ to designate vertical alignment.

```
\parbox[c]{\textwidth}{
Here is a basic box around a
paragraph. We have set a
reasonable width relative to
textwidth, and the text is
centered vertically. Note
that the ‘pos’ variable can
be either ‘t’, ‘b’, or ‘c’ to
designate vertical alignment.}
```

Boxes

`makebox{}` and `mbox`

The `\makebox[width][pos]{text}` command is meant to operate on a single line with added horizontal control:

A simple example.

```
\makebox[\textwidth][s] {  
A simple example.  
}
```

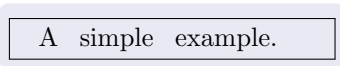
Width is optional and specified as before, but 'pos' is either 'l', 'r', or 's' for horizontal flushleft, flushright, or spread, respectively.

The `\mbox{text}` command simply defines a box which will automatically set to the width of the specified text without additional options.

Boxes

`framebox{}` and `fbox`

The `\framebox[width][pos]{text}` command is exactly the same as the `\makebox` command, except that it puts a frame around the outside of the box that it creates:

A simple example of a boxed text. The text "A simple example." is enclosed in a rectangular frame with a double-line border.

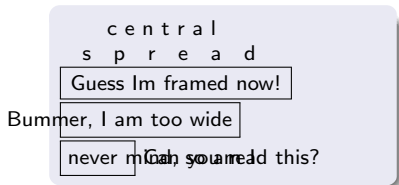
```
\framebox[\textwidth][s] {  
A simple example.  
}
```

The `\fbox{text}` command is exactly the same as the `\mbox{text}` command, except that it puts a frame around the outside of the box that it creates.

Boxes

Example so far

An example combining the box structures explored so far is adapted from the “Not So Short ...” document by Oetiker:



```
\makebox[.6\textwidth]{
c e n t r a l}\par
\makebox[.6\textwidth][s]{
s p r e a d}\par
\framebox[1.1\width]{Guess I'm
framed now!} \par
\framebox[0.8\width][r]{Bummer,
I am too wide} \par
\framebox[1cm][l]{never
mind, so am I}
Can you read this?}
```

Boxes

`\raisebox{}`

The `\raisebox{lift}[extend-above-baseline][extend-below-baseline]{text}` command gives strange and wonderful vertical control to properties of a box. 'lift' is the distance the specified text will raise from the baseline of the current line. The other two optional parameters control the line spacing to other text above and below the current `\raisebox` item.

An example is adapted from the “Not So Short ...” document by Oetiker:

Aaaaaa she shouted,
but not even aa next one in line noticed
that something terrible g had happened to
her. h

```
\frame {
\parbox[c]{\textwidth} {
\raisebox{-5pt}[0pt][0pt]{\Large
\textbf{Aaaa\raisebox{-0.3ex}{a}
\raisebox{-0.7ex}{aa}
\raisebox{-1.2ex}{r}
\raisebox{-2.2ex}{g}
\raisebox{-4.5ex}{h}}}}
she shouted, but not even the next
one in line noticed that something
terrible had happened to her. }}
```

Outline

- 1 Scope
- 2 Horizontal Spacing Control
 - `hspace{}` and `hspace*{}`
 - Font Size and `hspace{}`
 - `hspace{}` and `stretch{}`, `hfill`
- 3 Vertical Spacing Control
 - `vspace{}` and `vspace*{}`
 - `vspace{}` and `stretch{}`, `vfill`
 - Other vertical spacers
- 4 Boxes
 - What are Boxes ?
 - `parbox{}` and `minipage`
 - `makebox{}` and `mbox`
 - `framebox{}` and `fbox`
 - Example so far
 - `raisebox{}`
- 5 Further Study On Your Own
- 6 Conclusion

Further Study On Your Own

There are several other \LaTeX spacing, length, and boxing commands which have not been covered in this presentation. Have at it:

- `\addvspace{length}` – extend the vertical space until it reaches length
- `\hrulefill`, `\dotfill` – fill out all available horizontal space with a line or with dots
- `\rule{width}{thickness}` – draw a line
- `\newsavebox{boxname}` – define the variable `boxname` to store a box
- `\savebox{boxname}{text}`, `\sbox{boxname}{text}` – save text into the variable `boxname`
- `\usebox{boxname}` – use material stored in box variable `boxname`

Outline

- 1 Scope
- 2 Horizontal Spacing Control
 - `hspace{}` and `hspace*{}`
 - Font Size and `hspace{}`
 - `hspace{}` and `stretch{}`, `hfill`
- 3 Vertical Spacing Control
 - `vspace{}` and `vspace*{}`
 - `vspace{}` and `stretch{}`, `vfill`
 - Other vertical spacers
- 4 Boxes
 - What are Boxes ?
 - `parbox{}` and `minipage`
 - `makebox{}` and `mbox`
 - `framebox{}` and `fbox`
 - Example so far
 - `raisebox{}`
- 5 Further Study On Your Own
- 6 Conclusion

Conclusion

Questions ??