

Tabulars, arrays and tables

João Canas Ferreira

2016-04-12

Contents

1	The basics	1
2	Making better tables	12
3	Arrays	14

1 The basics

Tables are made using the `\tabular` environment:

```
\begin{tabular}{|l|l|l|}  
  \hline  
  \multicolumn{3}{|c|}{A Table}\hline  
  \hline  
  1,1 hello & 1,2 & 1,3 \hline  
  2,1 & 2,2 & 2,3 \cline{1-2}  
  3,1 & 3,2 & \hline  
\end{tabular}
```

A Table		
1,1 hello	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

The basic column alignments are **left**, **center** and **right**.

A table is just a box and can be treated like a character.

```
\begin{tabular}{|1|1|1|1|}
\hline
\multicolumn{3}{|c|}{A Table}\\\hline
\hline
1,1 & 1,2 & 1,3 \\ \hline
2,1 & 2,2 & 2,3 \\ \cline{1-2}
3,1 & 3,2 & \\ \hline
\end{tabular} \textcolor{blue}{Here is normal text}
```

A Table		
1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

Here is normal text

```
\begin{tabular}[t]{|1|1|1|1|}
\hline
\multicolumn{3}{|c|}{A Table}\\\hline
\hline
1,1 & 1,2 & 1,3 \\ \hline
2,1 & 2,2 & 2,3 \\ \cline{1-2}
3,1 & 3,2 & \\ \hline
\end{tabular} \textcolor{blue}{Here is normal text}
```

Here is normal text

A Table		
1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

```

\begin{tabular}[b]{|1|1|1|}
  \hline
  \multicolumn{3}{|c|}{A Table}\hline
  \hline
  1,1 & 1,2 & 1,3 \hline
  2,1 & 2,2 & 2,3 \cline{1-2}
  3,1 & 3,2 & \hline
\end{tabular} \textcolor{blue}{Here is normal text}

```

A Table		
1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

Here is normal text

Another column specifier is allowed: `p{width}` for a paragraph of fixed width.

```
\begin{tabular}{|p{3cm}|l|l|}
\hline
\multicolumn{3}{|c|}{A Table}\hline
\hline
1,1 & 1,2 & 1,3 \hline
\centering 2,1 \linebreak 6 & 2,2 & 2,3 \cline{1-2}
\hfill 3,1 & 3,2 & \hline
\end{tabular}
```

A Table		
1,1	1,2	1,3
2,1 6	2,2	2,3
3,1	3,2	

To increase the height of rows, you can alter the command `arraystretch` (which is just a number).

```
\renewcommand{\arraystretch}{1.5}
\begin{tabular}{*{3}{|l|}}
\hline
\multicolumn{3}{|c|}{A Table}\hline
\hline
1,1 & 1,2 & 1,3 \hline
2,1 & 2,2 & 2,3 \cline{1-2}
3,1 & 3,2 & \hline
\end{tabular}
```

A Table		
1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

To insert spaces between columns, use @{}.

```
\begin{tabular}{|l|@{}l|l|}  
  \hline  
  \multicolumn{3}{|c|}{A Table}\hline  
  \hline  
  1,1 & 1,2 & 1,3 \hline  
  2,1 & 2,2 & 2,3 \cline{1-2}  
  3,1 & 3,2 & \hline  
\end{tabular}
```

A Table		
1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

The package `array` (<http://ctan.org/pkg/array>) extends (re-implements) tables and arrays. The `dcolumn` (<http://ctan.org/pkg/dcolumn>) package uses the `array` package to define a new column specifier `D` with three arguments:

```
D{separator-input}{separator-output}{max decimal places}
```

Example:

```
\newcolumntype{d}[1]{D{,}{.}{#1}} % in the preamble
```

```
\begin{tabular}{|l|d{4}|l|}
\hline
\multicolumn{3}{|c|}{A Table}\\\hline
\hline
1,1 & 1,245 & 1,3 \\ \hline
2,1 & 32,2 & 2,3 \\ \cline{1-2}
3,1 & ,2 & \\ \hline
\end{tabular}
```

A Table		
1,1	1.245	1,3
2,1	32.2	2,3
3,1	.2	

You can also insert commands:

```
\begin{tabular}{|l|>{$}c<{$}|>{\itshape}l|}  
  \hline  
  \multicolumn{3}{|c|}{A Table}\\\hline  
  \hline  
  1,1 & \pi & 1,3 \\\hline  
  2,1 & 32,2 & 2,3 \\\cline{1-2}  
  3,1 & ,2 & \\\hline  
\end{tabular}
```

A Table		
1,1	π	<i>1,3</i>
2,1	32,2	<i>2,3</i>
3,1	,2	

Table 1: What is this table about?

A Table		
1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

A table is usually put inside a `table` environment (a type of “float”) together with a caption.

```
\begin{table}[tbp]
  \centering
  \caption{What is this table about?}
  \medskip
  \begin{tabular}{|l|l|l|}
\hline
\multicolumn{3}{|c|}{A Table}\hline
\hline
1,1 & 1,2 & 1,3 \hline
2,1 & 2,2 & 2,3 \cline{1-2}
3,1 & 3,2 & \hline
\end{tabular}
  \label{tab:ex1}
\end{table}
```

A table will float to the correct position (top, bottom or a page just with figures) and you can refer to it as Tab. 1 (using the command `\ref{tab:ex1}`).

It may be possible to force the table to the bottom of the page, as shown by Tab. 2.

```
\begin{table}[b]
\centering
\caption{What is this table about?}
\medskip
\begin{tabular}{|l|l|l|}
\hline
\multicolumn{3}{|c|}{A Table}\\\hline
\hline
1,1 & 1,2 & 1,3 \\ \hline
2,1 & 2,2 & 2,3 \\ \cline{1-2}
3,1 & 3,2 & \\ \hline
\end{tabular}
\label{tab:ex2}
\end{table}
```

Table 2: What is this table about?

A Table		
1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

Footnotes do not work inside the `table` environment. Instead, use the command `\tablefootnote` from the package `tablefootnote`.

```
\begin{table}[h]
  \centering
  \caption{What is this table about?}
  \medskip
  \begin{tabular}{|1|1|1|1|}
    \hline
    \multicolumn{3}{|c|}{A Table}\\\hline
    \hline
    1,1\tablefootnote{Message} & 1,2 & 1,3 \\ \hline
    2,1 & 2,2 & 2,3 \\ \cline{1-2}
    3,1 & 3,2 & \\ \hline
  \end{tabular}
  \label{tab:ex3}
\end{table}
```

Table 3: What is this table about?

A Table		
1,1 ¹	1,2	1,3
2,1	2,2	2,3
3,1	3,2	

¹Message

If you need to keep a footnote in the table (not at the bottom of the page), you can wrap the tabular in a minipage environment.

```

\begin{table}[h]
  \centering
  \caption{What is this table about?}
  \medskip
  \begin{minipage}{5cm}\centering
  \begin{tabular}{|1|1|1|}
    \hline
    \multicolumn{3}{|c|}{A Table}\\\hline
    \hline
    1,1\footnote{Extensive comment here with
      additional information}
      & 1,2 & 1,3 \\ \hline
    2,1 & 2,2 & 2,3 \footnote{Another comment} \\ \cline{1-2}
    3,1 & 3,2 & \\ \hline
  \end{tabular}
  \end{minipage}
  \label{tab:ex4}
\end{table}

```

Table 4: What is this table about?

A Table		
1,1 ^a	1,2	1,3
2,1	2,2	2,3 ^b
3,1	3,2	

^aExtensive comment here
with additional information

^bAnother comment

2 Making better tables

The package `booktabs` is strongly recommended for making clear and readable tables.

```
\begin{tabular}{llr} \toprule
\multicolumn{2}{c}{Item} \\\ \cmidrule(r){1-2}
Animal & Description & Price (\$) \\\ \midrule
Gnat & per gram & 13.65 \\\
& each & 0.01 \\\
Gnu & stuffed & 92.50 \\\
Emu & stuffed & 33.33 \\\
Armadillo & frozen & 8.99 \\\ \bottomrule
\end{tabular}
```

Item		
Animal	Description	Price (\$)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

The trimming commands to `\cmidrule`, if used, go in parentheses, with no spaces separating them. The possible specifications are `r`, `r{wd}`, `l` and `l{wd}`, or any combination of these, where `wd` is a dimension, and `r` and `l` tell whether the right and/or left ends of the rule should be trimmed.

What is the difference?

```
\begin{tabular}{@{}llr@{}} \toprule
\multicolumn{2}{c}{Item} \\\ \cmidrule{1-2}
Animal & Description & Price (\$)\\\ \midrule
Gnat & per gram & 13.65 \\\
& each & 0.01 \\\
Gnu & stuffed & 92.50 \\\
Emu & stuffed & 33.33 \\\
Armadillo & frozen & 8.99 \\\ \bottomrule
\end{tabular}
```

Item		
Animal	Description	Price (\$)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

3 Arrays

The `array` environment is similar to the `tabular` environment, but should be used in math mode.

```
\[
\begin{array}{ccc}
14 & 12 & 19 \\
67 & -2 & 123 \\
\pi & \gamma & \lambda
\end{array}
\]
```

$$\begin{array}{ccc} 14 & 12 & 19 \\ 67 & -2 & 123 \\ \pi & \gamma & \lambda \end{array}$$

You can get braces around the array:

```
\[
\left(
\begin{array}{ccc}
14 & 12 & 19 \\
67 & -2 & 123 \\
\pi & \gamma & \lambda
\end{array}
\right)
\]
```

$$\left(\begin{array}{ccc} 14 & 12 & 19 \\ 67 & -2 & 123 \\ \pi & \gamma & \lambda \end{array} \right)$$

You can use the `\hline` command and insert vertical lines.

```
\[
\left(
\begin{array}{cc|c}
14 & 12 & 19 \\
67 & -2 & 123 \\
\hline
\pi & \gamma & \lambda
\end{array}
\right)
\]
```

$$\left(\begin{array}{cc|c} 14 & 12 & 19 \\ 67 & -2 & 123 \\ \hline \pi & \gamma & \lambda \end{array} \right)$$

Arrays can also be used to align equations.

```
\[
\begin{array}{rcl}
e^{i\pi} + 1 & = & 0 \\
\sin x & = & \pm\sqrt{1-\cos^2 x}
\end{array}
\]
```

$$\begin{array}{rcl} e^{i\pi} + 1 & = & 0 \\ \sin x & = & \pm\sqrt{1-\cos^2 x} \end{array}$$

However, there are more powerful ways to handle matrices and equations using the `amsmath` (which is part of the L^AT_EX required distribution) and `mathtools` (available at www.ctan.org/pkg/mathtools) packages.