An Improved Environment for Floats[*]

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Abstract

This style option improves the interface for defining floating objects such as figures and tables in LaTeX. It adds the notion of a 'float style' that governs appearance of floats. New kinds of floats may be defined using a \newfloat command analogous to \newtheorem. This style option also incorporates the functionality of David Carlisle's style option here, giving floating environments a [H] option which means 'PUT IT HERE' (as opposed to the standard [h] option which means 'You may put it here if you like').

1 Introduction

Among the features of LaTeX are 'floating' figures and tables that drift from where they appear in the input text to, say, the top of a page. The contents and formatting of floats is pretty much up to the user, except that there is a \caption command that governs formatting of the caption — it is centered if it is short, and formatted as a paragraph if it is longer than a single line of text. Sometimes other types of floating objects, e.g., algorithms or programs, are desirable, but they must be defined by analogy to the existing floats since there is no simple command for doing this. This goes beyond the knowledge or inclination of the average LaTeX user.

In this style option, I present an interface to floating objects that attempts to fix some of these shortcomings. First of all, I introduce the notion of a 'float style'. A float style governs the appearance of a class of floats like a page style governs the appearance of a page (LaTeX has page styles plain, empty and headings, among others). This style option provides some exemplary float styles:

plain This is the float style that LaTeX normally applies to its floats, i.e., nothing in particular. The only difference is that the caption comes out *below* the body of the float, regardless of where it is given in the text.

plaintop This is similar to 'plain' but the caption always comes out *above* the body of the float.

boxed The body of the float is printed inside a box. The caption goes below that box.

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[*]This file has version number 2.19. Part of this style option is based on the here option by David P. Carlisle (carlisle@cs.man.ac.uk), who also provided helpful criticism.

Program 1.1 The first program. This hasn't got anything to do with the package but is included as an example. Note the `ruled` float style.

```
#include <stdio.h>

int main(int argc, char **argv)
{
        int i;
        for (i = 0; i < argc; ++i)
                printf("argv[%d] = %s\n", i, argv[i]);
        return 0;
}
```

ruled This float style is patterned on the table style of *Concrete Mathematics*. The caption is printed at the top of the float, surrounded by rules; another rule finishes off the float.

To facilitate the definition of new floating objects, float supports the `\newfloat` command. This command is comparable to `\newtheorem` in that it allows the user to add a new class of floats at the document level. No style option hacking is necessary. There's also a `\listof` command that prints a listing of all the floats of a given type, like `\listoffigures` and `\listoftables` in vanilla LaTeX.

2   The User Interface — New Floats

`\newfloat` The most important command in float is the `\newfloat` command. As mentioned above, it is patterned on `\newtheorem`. The `\newfloat` command takes three required and one optional argument; it is of the form

$\newfloat\{\langle type\rangle\}\{\langle placement\rangle\}\{\langle ext\rangle\}[\langle within\rangle]$

$\langle type\rangle$ is the 'type' of the new class of floats, like `program` or `algorithm`. After the appropriate `\newfloat`, commands like `\begin{program}` or `\end{algorithm*}` will be available. $\langle placement\rangle$ gives the default placement parameters for this class of floats. The placement parameters are the same as in standard LaTeX, i.e., `t`, `b`, `p` and `h` for 'top', 'bottom', 'page' and 'here', respectively. When LaTeX writes the captions to an auxiliary file for the list of figures (or whatever), it'll use the job name followed by $\langle ext\rangle$ as a file name. Finally, the optional argument $\langle within\rangle$ determines whether floats of this class will be numbered within some sectional unit of the document. For example, if $\langle within\rangle$=`chapter`, the floats will be numbered within chapters. (In standard LaTeX, this happens with figures and tables in the report and book document styles.) As an example, Program 1.1 above was created by a command sequence similar to that shown in the following Example.

```
\floatstyle{ruled}
\newfloat{Program}{tbp}{lop}[section]
... loads o' stuff ...
\begin{Program}
\begin{verbatim}
... program text ...
\end{verbatim}
\caption{... caption ...}
\end{Program}
```

Example 2.1: This is another silly floating Example. Except that this one doesn't actually float because it uses the [H] optional parameter to appear **Here**. (Gotcha.)

\floatstyle   The \floatstyle command sets a default float style. This float style will be used for all the floats that are subsequently defined using \newfloat, until another \floatstyle command appears. The \floatstyle command takes one argument, the name of a float style. For instance, \floatstyle{ruled}. Specifying a string that does not name a valid float style is an error.

\floatname   The \floatname command lets you define the *float name* that LaTeX uses in the caption of a float, i.e., 'Figure' for a figure and so on. For example, \floatname{program}{Program}. The \newfloat command sets the float name to its argument ⟨*type*⟩ if no other name has been specified before.

\floatplacement   The \floatplacement command resets the default placement specifier of a class of floats. E.g., \floatplacement{figure}{tp}.

\restylefloat   The \restylefloat command is necessary to change styles for the standard float types `figure` and `table`. Since these aren't usually defined via \newfloat, they don't have a style associated with them. Thus you have to say, for example,

```
\floatstyle{ruled}
\restylefloat{table}
```

to have tables come out `ruled`. The command also lets you change style for floats that you define via \newfloat, although this is, typographically speaking, not a good idea. See table 1 for an example. There is a \restylefloat* command which will restyle an existing float type but will keep the new float style from taking over the \caption command. In this case the user is responsible for handling their own captions.

\listof   The \listof command produces a list of all the floats of a given class. Its syntax is

\listof{⟨*type*⟩}{⟨*title*⟩}

⟨*type*⟩ is the float type given in the \newfloat command. ⟨*title*⟩ is used for the title of the list as well as the headings if the current page style includes them. Otherwise, the \listof command is analogous to the built-in LaTeX commands \listoffigures and \listoftables.

3   The User Interface — [H] **Placement Specifier**

Many people find LaTeX's float placement specifiers too restrictive. A Commonly Uttered Complaint (CUC) calls for a way to place a float exactly at the spot where

n	$\binom{n}{0}$	$\binom{n}{1}$	$\binom{n}{2}$	$\binom{n}{3}$	$\binom{n}{4}$	$\binom{n}{5}$	$\binom{n}{6}$	$\binom{n}{7}$
0	1							
1	1	1						
2	1	2	1					
3	1	3	3	1				
4	1	4	6	4	1			
5	1	5	10	10	5	1		
6	1	6	15	20	15	6	1	
7	1	7	21	35	35	21	7	1

Table 1: Pascal's triangle. This is a re-styled LaTeX `table`.

it occurs in the input file, i.e., to *not* have it float at all. It seems that the `[h]` specifier should do that, but in fact it only suggests to LaTeX something along the lines of "put the float here if it's OK with you". As it turns out, LaTeX hardly ever feels inclined to actually do that. This situation can be improved by judicious manipulation of float style parameters.

The same effect can be achieved by changing the actual method of placing floats. David Carlisle's here option introduces a new float placement specifier, namely `[H]`, which, when added to a float, tells LaTeX to "put it HERE, period". If there isn't enough space left on the page, the float is carried over to the next page together with whatever follows, even though there might still be room left for some of that. This style option provides the `[H]` specifier for newly defined classes of floats as well as the predefined `figures` and `tables`, thereby superseding here. David suggests that the here option be withdrawn from the archives in due course.

The `[H]` specifier may simply be added to the float as an optional argument, like all the other specifiers. It may *not* be used in conjunction with any other placement specifiers, so `[Hhtbp]` is illegal. Neither may it be used as the default placement specifier for a whole class of floats. The following table is defined like this:

```
\begin{table}[H]
\begin{tabular}{cl}
\tt t & Top of the page\\
... more stuff ...
```

(It seems that I have to add some extraneous chatter here just so that the float actually comes out right in the middle of a printed page. When I LaTeXed the documentation just now it turned out that there was a page break that fell exactly between the "So now" line and the float. This wouldn't Prove Anything. Bother.) So now we have the following float placement specifiers:

t	Top of the page
b	Bottom of the page
p	Page of floats
h	Here, if possible
H	Here, definitely