

An easier interface to insert figures, tables and other objects in L^AT_EX

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Abstract

In standard L^AT_EX inserting objects like figures or tables requires too much knowledge for beginners and too much typing effort and hardcoding for people like me. This package aims to make insertion of figures and tables easier for both beginners and experts. Despite the term *floats* in it's name it also allows to disable floating of such objects.

<https://gitlab.com/erzo/latex-easyfloats>

Contents

1	Examples	3
1.1	Table	3
1.2	Graphic	3
1.3	Subobjects	4
1.4	Longtable	5
1.5	Local definitions in tables	7
1.6	New object style / <code>tikzobject</code>	9
1.7	Nonfloating objects	10
2	Names	10
3	Documentation	10
3.1	Options	10
3.1.1	Initial vs default values	11
3.1.2	Options scope	11
3.1.3	Special characters in options	11
3.1.4	Key patterns	11
3.1.5	Key name vs key path	12
3.1.6	Key types	12
3.1.7	Styles	12
3.1.8	Style groups	13
3.1.9	Options processing order	13
3.2	Environments	13
3.2.1	<code>object</code> environment	13
3.2.2	<code>figureobject</code> environment	21
3.2.3	<code>tableobject</code> environment	21
3.2.4	<code>subobject</code> environment	21
3.3	Commands	25
3.3.1	<code>\includegraphicobject</code> command	26
3.3.2	<code>\includegraphicsubobject</code> command	27
3.3.3	Setting options globally	27
3.3.4	New object styles and types	28
3.3.5	New object style groups	29
3.3.6	Hooks	29
3.4	Initialization	30
3.5	Package options	30
3.6	Help	31
4	Installation	32
5	Bug reports and contributions	32
6	License	33
A	Motivation	33
B	Used packages	40
C	Other packages	41
D	References	42

1 Examples

Let's start with a few examples. Environments, commands and keys defined by this package are links (both in the code and in the text). Klicling on them will get you to their explanation in section 3.

Appendix A gives a motivation why this package is useful. There is a list of related packages in appendices B and C. Package names link to the rather short description in that list.

1.1 Table

Use the `tableobject` environment for inserting tables. Pass caption and label as keyword arguments. You can't mess up the order of caption and label and you get a warning if you forget to specify them. You don't need two environments (one for the float, one for the table—`tableobject` can do both). `booktabs` (and `array`) are loaded automatically (if not disabled, see section 3.5).

```
\documentclass{article}
\usepackage{easyfloats}
\objectset{warn no label=false}

\begin{document}
\begin{tableobject}{caption=Some catcodes, env=tabular}{cl}
  \toprule
    Catcode & Meaning          \\
  \midrule
    0      & Escape Character \\
    1      & Begin Group      \\
    2      & End Group        \\
    \vdots & \quad \vdots    \\
  \bottomrule
\end{tableobject}
\end{document}
```

You can reduce typing effort even further by using the `table head` key, see section 1.4.

1.2 Graphic

Use the `\includegraphicobject` command to insert a graphic. It is a wrapper around `graphicx`' `\includegraphics` command taking the same arguments. No need for a surrounding `figure` environment. I have extended the allowed optional keyword argument to also accept caption, label and more. `details` are appended to the caption below the figure but not in the list of figures. Select with the `graphicx` or `graphbox` package options whether you want to use the commonly used `graphicx` package or it's extension `graphbox`.

```
\documentclass{article}
\usepackage{easyfloats}
\usepackage{hyperref}
```

```

\objectset[figure]{graphic width=.8\linewidth}

\begin{document}
\includegraphicobject[%
  label = lion,
  caption = CTAN lion drawing by Duane Bibby,
  details = Thanks to \href
    ↪ {https://ctan.org/lion/files}{www.ctan.org}.,
]{graphics/ctan_lion}

\listoffigures
\end{document}

```

If you omit `caption` or `label` the file name is used. See `auto label`, `auto caption`, `auto label strip path` and `auto caption strip path`.

1.3 Subobjects

Use the `subobject` environment to combine two (or more) subobjects to one big object. The `contains subobjects` option causes the `env` option to be applied to the subobjects instead of the containing object. Changing the `subobject linewidth` is usually not necessary but in this example the tables fill only a small part of the width so they are too far apart from each other if each is centered on `.5\linewidth`. Pay attention to *not* insert an empty line between the subobjects, otherwise they will be placed below each other instead of side by side. If you want them to be placed below each other you can use the `ver` option.

`\captionsetup` is explained in the `caption` package documentation [1].

```

\documentclass{article}
\usepackage{easyfloats}

\objectset[table]{env=tabular}
\captionsetup[sub]{list=true}

\begin{document}
\begin{tableobject}{contains subobjects,
  caption = Two test tables,
  label = tabs abc 123,
  subobject linewidth = .25\linewidth,
}
\begin{subobject}{caption=Abc \& 123}{rl}
\toprule
abc & 123 \\
de & 45 \\
f & 6 \\
\bottomrule
\end{subobject}
\begin{subobject}{caption=123 \& abc}{lr}
\toprule

```

```

123 & abc \\
45 & de \\
6 & f \\
\bottomrule
\end{subobject}
\end{tableobject}
\end{document}

```

1.4 Longtable

If you are undecided whether to use floating `tabulars` or `longtables` which can break across pages you can use the following approach. Changing between them is as easy as changing `env=longtable` to `env=tabular` once. The table head and foot are set by the key `table head` and are by default formatted with the `booktabs` package. (If you don't like this you can change the definition of `table head` with `table head style`.) The column specification cannot be given as a separate argument (like in the example above) but must be set with the `arg` key because otherwise the column specification would be after the table head.

```

\documentclass{article}
\usepackage[longtable]{easyfloats}
\usepackage{siunitx}

\newcommand\pminfty{\multicolumn1r{ $\pm\infty$ }}

\objectset[table]{env=longtable}

\begin{document}
\begin{tableobject}{%
caption = Trigonometric functions,
label = trifun,
arg = {
S[table-format=2.0, table-space-text-post=\si{\degree}]
↔ <\si{\degree} !\quad
*2{S[table-format=+1.2]}
S[table-format=+4.2]
},
table head = \multicolumn1{c!\quad}{ $x$ } &  $\sin x$ 
↔ &  $\cos x$  &  $\tan x$ ,
}

```

0	&	0.00	&	1.00	&	0.00	\\
5	&	0.09	&	1.00	&	0.09	\\
10	&	0.17	&	0.98	&	0.18	\\
15	&	0.26	&	0.97	&	0.27	\\
20	&	0.34	&	0.94	&	0.36	\\
25	&	0.42	&	0.91	&	0.47	\\
30	&	0.50	&	0.87	&	0.58	\\
35	&	0.57	&	0.82	&	0.70	\\

```

40 & 0.64 & 0.77 & 0.84 \\
45 & 0.71 & 0.71 & 1.00 \\
50 & 0.77 & 0.64 & 1.19 \\
55 & 0.82 & 0.57 & 1.43 \\
60 & 0.87 & 0.50 & 1.73 \\
65 & 0.91 & 0.42 & 2.14 \\
70 & 0.94 & 0.34 & 2.75 \\
75 & 0.97 & 0.26 & 3.73 \\
80 & 0.98 & 0.17 & 5.67 \\
85 & 1.00 & 0.09 & 11.43 \\
90 & 1.00 & 0.00 & \pminfty \\
\end{tableobject}
\begin{tableobject}{%
caption = Squared trigonometric functions,
label = trifun2,
arg = {
S[table-format=2.0, table-space-text-post=\si{\degree}]
↪ <{\si{\degree}} !\quad
*2{S[table-format=+1.2]}
S[table-format=+4.2]
},
table head = \multicolumn1{c!\quad}{x$} & {\$sin^2 x$}
↪ & {\$cos^2 x$} & {\$tan^2 x$},
}
0 & 0.00 & 1.00 & 0.00 \\
5 & 0.01 & 0.99 & 0.01 \\
10 & 0.03 & 0.97 & 0.03 \\
15 & 0.07 & 0.93 & 0.07 \\
20 & 0.12 & 0.88 & 0.13 \\
25 & 0.18 & 0.82 & 0.22 \\
30 & 0.25 & 0.75 & 0.33 \\
35 & 0.33 & 0.67 & 0.49 \\
40 & 0.41 & 0.59 & 0.70 \\
45 & 0.50 & 0.50 & 1.00 \\
50 & 0.59 & 0.41 & 1.42 \\
55 & 0.67 & 0.33 & 2.04 \\
60 & 0.75 & 0.25 & 3.00 \\
65 & 0.82 & 0.18 & 4.60 \\
70 & 0.88 & 0.12 & 7.55 \\
75 & 0.93 & 0.07 & 13.93 \\
80 & 0.97 & 0.03 & 32.16 \\
85 & 0.99 & 0.01 & 130.65 \\
90 & 1.00 & 0.00 & \pminfty \\
\end{tableobject}
\begin{tableobject}{%
caption = Cubed trigonometric functions,
label = trifun3,
arg = {

```

```

S[table-format=2.0, table-space-text-post=\si{\degree}]
↪ <{\si{\degree}} !\quad
*2{S[table-format=+1.2]}
S[table-format=+4.2]
},
table head = \multicolumn1{c!\quad}{x} & {\sin^3 x}
↪ & {\cos^3 x} & {\tan^3 x},
}

0 & 0.00 & 1.00 & 0.00 \\
5 & 0.00 & 0.99 & 0.00 \\
10 & 0.01 & 0.96 & 0.01 \\
15 & 0.02 & 0.90 & 0.02 \\
20 & 0.04 & 0.83 & 0.05 \\
25 & 0.08 & 0.74 & 0.10 \\
30 & 0.12 & 0.65 & 0.19 \\
35 & 0.19 & 0.55 & 0.34 \\
40 & 0.27 & 0.45 & 0.59 \\
45 & 0.35 & 0.35 & 1.00 \\
50 & 0.45 & 0.27 & 1.69 \\
55 & 0.55 & 0.19 & 2.91 \\
60 & 0.65 & 0.13 & 5.20 \\
65 & 0.74 & 0.08 & 9.86 \\
70 & 0.83 & 0.04 & 20.74 \\
75 & 0.90 & 0.02 & 51.98 \\
80 & 0.96 & 0.01 & 182.41 \\
85 & 0.99 & 0.00 & 1493.29 \\
90 & 1.00 & 0.00 & \pminfty \\
\end{tableobject}
\end{document}

```

1.5 Local definitions in tables

If you want to define a command locally for one table you cannot put its definition in the first cell because each cell is a separate group (meaning that the definition will be forgotten at the end of the cell). Instead I provide the `exec` key whose value is executed inside of the object but before `env`. If you want to tinker around with catcodes keep in mind that arguments are always read entirely before expansion and execution. The ε -TeX primitive `\scantokens` can be useful to define active characters. If you are unfamiliar with how TeX processes a file you can read up on it in *TeX by Topic* [2, section 1].

```

\documentclass{article}
\usepackage{easyfloats}
\usepackage[table]{xcolor}

% avoid Warning: Font shape `OMS/cmtt/m/n' undefined
\usepackage[T1]{fontenc}
% fontenc T1 causes unclean/pixelated font on some systems

```

```

% and trouble with copying ligatures from pdf => change font
% lmodern is relatively close to the default font but unmaintained
\usepackage{lmodern}

\colorlet{rowbg}{gray!50}

\newcommand\charsym[1]{\texttt{#1}}
\newcommand\charname[1]{\langle$#1$\rangle$}

\begin{document}
\begin{tableobject}{%
caption = Category Codes,
details = Highlighted catcodes have no tokens.,
label = catcodes,
env = tabular,
arg = cll,
table head = Catcode & Meaning & Characters,
exec = {%
\catcode`* = \active
\scantokens{\def*{\rowcolor{rowbg}}}%
\catcode`= = \the\catcode`&%
\catcode`, = \the\catcode`&%
},
}
* 0 = Escape character, \charsym\textbackslash \\
1 = Begin grouping, \charsym\{ \\
2 = End grouping, \charsym\} \\
3 = Math shift, \charsym\$ \\
4 = Alignment tab, \charsym\& \\
* 5 = End of line, \charname{return} \\
6 = Parameter, \charsym\# \\
7 = Superscript, \charsym\^ \\
8 = Subscript, \charsym\_ \\
* 9 = Ignored character, \charname{null} \\
10 = Space, \charname{space} and \\
\charname{tab} \\
11 = Letter, \charsym{a}--\charsym{z} and \\
\charsym{A}--\charsym{Z} \\
12 = Other, other characters \\
% "In plain TeX this is only the tie character ~"
% TeX by Topic, page 30
13 = Active character, \charsym{\string~} \\
* 14 = Comment character, \charsym\% \\
* 15 = Invalid character, \charname{delete} \\
\end{tableobject}
\end{document}

```

1.6 New object style / tikzobject

You can easily define new object environments. For more information see section 3.3.4.

```
\documentclass{article}
\usepackage{easyfloats}
\usepackage{tikz}

\NewObjectStyle{tikz}{type=figure, env=tikzpicture}
% I am not using `arg=[3D]` so that I can still pass an optional
↪ argument to tikz3dobject
\NewObjectStyle{tikz3d}{type=figure, env=tikzpicture,
↪ exec=\tikzset{3D}}

\tikzset{
  3D/.style = {
    x = {(-3.85mm, -3.85mm)},
    y = {(1cm, 0cm)},
    z = {(0cm, 1cm)},
  },
}
\objectset{warn no label=false}

\begin{document}
\begin{tikzobject}{caption=2D coordinate system}
  \newcommand\n{5}
  \newcommand\w{.075}
  \draw[->] (0,0) -- ++(\n,0);
  \draw[->] (0,0) -- ++(0,\n);
  \foreach \i in {1,...,\n-1} {
    \draw (\i,0) +(0,\w) -- +(0,-\w);
    \draw (0,\i) +(\w,0) -- +(-\w,0);
  }
\end{tikzobject}
\begin{tikz3dobject}{caption=3D coordinate system}
  \newcommand\n{5}
  \newcommand\w{.075}
  \draw[->] (0,0,0) -- ++(\n,0,0);
  \draw[->] (0,0,0) -- ++(0,\n,0);
  \draw[->] (0,0,0) -- ++(0,0,\n);
  \foreach \i in {1,...,\n-1} {
    \draw (\i,0,0) +(0,\w,0) -- +(0,-\w,0);
    \draw (0,\i,0) +(\w,0,0) -- +(-\w,0,0);
    \draw (0,0,\i) +(0,\w,0) -- +(0,-\w,0);
  }
\end{tikz3dobject}
\end{document}
```

1.7 Nonfloating objects

If your professor absolutely won't allow floating objects you can easily disable them globally (for all objects based on the `object` environment defined by this package which is internally used by `tableobject` and `\includegraphicobject`).

```
\objectset{placement=H}
```

2 Names

You have probably heard the term *floating object* or *float* for short. That is mainly what this package is about. However, I intended to avoid the term *floating* in the name of this package because this package also allows to globally disable the floating of those objects. Therefore I decided to name this package *objects*.

This name, however, has been rejected by T_EX Live as being too generic. And they are right, especially for people with an object oriented programming background that name might be misleading. T_EX Live has informed me that floating objects are still called floats even if they are technically not floating. Therefore I have decided to rename this package to *easyfloats*.

I have *not* changed the user interface because the package has already been online for more than half a year on my gitlab repository and I don't know how many people are using the package already. Therefore all commands and environments defined by this package still carry the old name *object* in them.

3 Documentation

This section contains the documentation on how to use this package.

Section 3.1 gives general information on options which environments and commands defined by this package may take. The options themselves are explained in sections 3.2 and 3.3 where the environments and commands defined by this package are explained.

Section 3.4 describes what is happening when loading this package. Section 3.5 describes the options which can be passed to `\usepackage` when loading this package.

Section 3.6 explains a few features which may help you to get a better understanding about what is going on. This might be useful if you run into unexpected errors or this package behaves different than you expected.

3.1 Options

The environments and commands defined by this package take options (implemented with the `pgfkeys` package). Options are a comma separated list of $\langle key \rangle$ s or $\langle key \rangle = \langle value \rangle$ pairs.

Which keys are allowed for which environment/command and which values are allowed for which key is specified in sections 3.2 and 3.3 where the environments

and commands are documented. This section gives general information about these options.

This section does *not* apply to the package options which are explained in section 3.5.

3.1.1 Initial vs default values

I am using the words *initial value* and *default value* like they are used in the *TikZ & PGF Manual* [3].

The *initial* value of an option is the value which is used if the key is *not* given.

The *default* value of an option is the value which is used if the key is given without a value. Most keys don't have a default value, i.e. if you use the key you must explicitly give it a value.

3.1.2 Options scope

Setting an option always applies until the end of the current group. For the argument of an environment this is the corresponding `\end` command. For the argument of the `\includegraphicsobject` command this is the end of this command. For the argument of `\objectset` this may be the end of the document.

If you are not familiar with the concept of groups in $\text{T}_{\text{E}}\text{X}$ *T_EX by Topic* [2, chapter 10] is one possible place to read up on it.

3.1.3 Special characters in options

If a value contains a comma or an equals sign it must be wrapped in curly braces.

Spaces before and after a comma (separating an option) and before or after an equals sign (separating key and value) are ignored. However, a space after the opening brace is *not* ignored. So if you put the first key on the next line make sure to comment out the linebreak. If a leading or trailing space in a value is desired wrap the value in curly braces.

`\par` (aka an empty line) is forbidden in keys but allowed in values.

3.1.4 Key patterns

Sometimes I am talking about entire groups of keys instead of individual keys. I specify those groups with a pattern which matches the keys that I am referring to. In these patterns parenthesis stand for something optional and angular brackets for wildcards.

For example the pattern `((env)) arg(s)` matches the keys `tabular* arg` and `args` (and many more) but not `env arg` because `env` is not an existing environment.

If a key has a version which ends on a `+` to append a value instead of replacing it the space in front of the `+` is optional.

3.1.5 Key name vs key path

`pgfkeys` organizes all keys “in a large tree that is reminiscent of the Unix file tree.” [3, page 954] The keys of this package are located in the three paths `/object`, `/subobject` and `/graphicobject`.

In error messages thrown by the `pgfkeys` package the full path of a key is shown.

When setting keys, however, you need not and should not specify the full path. The commands and environments of this package set the path automatically. Using full paths does not directly cause an error or a warning but trying to set options for a style or style group with `\objectset` causes undefined behavior.

Therefore, error messages thrown directly by this package omit the path and show the name of the key only.

3.1.6 Key types

In `pgfkeys` there are different types of keys. Which type a key belongs to is relevant for debugging if you want to check the value of a key, see section 3.6.

- (`sto`) *storing key*: Keys of this type are like a variable. They store the given value. This value can be showed using the `.show value` handler (see section 3.6).
- (`exe`) *executed key*: Keys of this type are like a function. They execute some predefined code and possibly take a value as argument.
- (`bool`) *boolean key*: is a special case of an executed key which sets a plain `TEX` if command. This if command and it’s meaning can be showed with the `.show boolean` handler (which is *not* contained in `pgfkeys`, I have defined it in this package).

The allowed values for a key of this type are `true` and `false`. The default value (i.e. the value which is assumed if the key is given without a value) is `true`.

- (`fwd`) *forwarding key*: is a special case of an executed key which calls another key.
- (`hdl`) *handler*: Keys defined in the path `/handlers`. They can be applied to other keys by appending them to the path. For users of this package they can be helpful for debugging. For example `\objectset{env/.show value}` shows the value of the key `env`.

The `pgfkeys` package also defines handlers which expand the value. I haven’t come up with an example where this might be useful in the context of this package but e.g. `tabular arg/.expand once=\colspec`, works as expected.

- (`unk`) *unknown key handler*: is a special key which is called if a given key does not exist and it’s name is not a handler. I am using this to implement key patterns.

3.1.7 Styles

This package defines two styles, one for figures and one for tables.

You can think of these styles as an extension of the `float` package’s float styles.

These styles are somewhat inspired by the `pgfkeys` styles but are different. They are neither set nor applied in the same way.

A style is a list of options which is not set immediately but locally for each object belonging to that style.

The options of a style can be set by passing the name of the style as an optional argument to the `\objectset` command, e.g. `\objectset[figure]{\options}` or `\objectset[table]{\options}`.

A style is applied by using the corresponding environment (e.g. `figureobject` or `tableobject`) or `\graphicobjectstyle{style}` for `\includegraphicobject`.

New styles can be defined with `\NewObjectStyle` as explained in section 3.3.4.

3.1.8 Style groups

This package defines one group of styles called `all` which contains all defined styles.

When setting options one can use a group name instead of a style name. In that case the options are set for all styles in the group.

3.1.9 Options processing order

1. Options set with `\objectset{\options}` have the lowest priority.
2. Options set for a specific style with `\objectset[styles]{\options}` take precedence because they are set later (at the object, not the `\objectset` command).
3. Options passed directly to the object have the highest priority.

For example:

```
\objectset[figure]{placement=p}  
\objectset{placement=H}  
\objectset[table]{placement=htbp}
```

Given the above preamble both figure- and tableobjects are floating. Tableobjects are allowed to be placed where they are specified in the source code. Figureobjects are put on a separate float page. The second line (which would disable floating) has no effect (unless you define a custom style) because it is overridden not only by the third but also the first line.

3.2 Environments

This package defines the following environments. Each of them takes exactly one mandatory argument, options as a comma separated key=value list.

3.2.1 object environment

Env `object` The `object` environment is used internally by `figureobject` and `tableobject`. Don't use this directly. You can define more environments like `figureobject` or `tableobject` with `\NewObjectStyle` if needed.

This environment redefines the `\caption` and `\label` commands to set the `caption/label` option so that you can use them as usual except you cannot create several labels. If you really need several labels for the same object put the additional `\label` command(s) inside of the caption argument, there `\label` has it's original meaning. The location or the order of `\caption` and `\label` inside of the object environment is not relevant. Nevertheless I recommend to always put the `\label` after the `\caption` as it is usually required in order to get the references right (if you choose to use these commands instead of the options). Where the caption is typeset (above or below the object) is determined by the float style.

This environment takes the following options:

- `type = <type>` ^(sto)

The floating environment to use, e.g. `figure` or `table`.

- `float style = plain|plaintop|ruled|boxed|<empty>` ^(sto)

Initial value: `empty`.

How the object is supposed to look like, most importantly whether the caption is supposed to be above or below the object. See the `float` package for more information.

If the value is empty the float type is *not* restyled before the/each object. However, this package restyles `table` to `plaintop` and `figure` to `plain` when it is loaded. The reasoning is explained in [4].

- `caption = <text>` ^(sto)

The caption to place above or below the float.

The appearance of the caption can be configured using `\captionsetup` defined by the `caption` package. The `caption` package is loaded automatically by this package.

- `list caption = <text>` ^(sto)

The caption to place in the list of `<type>`s. If this is not given, the value of `caption` is used instead.

- `details = <text>` ^(sto)

This is appended to the caption which is placed above or below the object but not to the list of `<type>`s.

```
caption=CTAN lion drawing by Duane Bibby,
details=Thanks to \url{www.ctan.org}.
```

is equivalent to

```
list caption=CTAN lion drawing by Duane Bibby,
caption=CTAN lion drawing by Duane Bibby.
↔ Thanks to \url{www.ctan.org}.
```

- `details sep = <text>` ^(sto)

Initial value: a full stop followed by a space.

The separator to be placed between caption and details if details are given.

- `label = <label>` ^(sto)

Defines a label to reference this object.

- `add label = <label>` ^(sto)

Defines an additional label which can be used synonymously to label. If this key is given several times, only the last one will have an effect.

- `placement = [htbp]+!?!H| <empty>` ^(sto)

Initial value: empty.

The optional argument passed to the floating environment. Allowed values:

- any combination of the letters `htbp` (where no letter is occurring more than once), optionally combined with an exclamation mark. This means that the object will be a floating object. The order of the letters makes no difference. They have the following meanings:

- * `h`: \LaTeX is allowed to place the object here, where it is defined.

- * `t`: \LaTeX is allowed to place the object at the top of a page.

- * `b`: \LaTeX is allowed to place the object at the bottom of a page.

- * `p`: \LaTeX is allowed to place the object on a separate page only for floats.

- * `!`: “ \LaTeX ignores the restrictions on both the number of floats that can appear and the relative amounts of float and non-float text on the page.” [5, page 27]

- `H`: \LaTeX places the object exactly here, no matter how unfitting that may be. In contrast to a single `h` or `h!` where the object is still a floating object which may float somewhere else if it does not fit here, `H` means here and nowhere else. `H` is defined by the `float` package which is loaded by this package automatically.

- empty: do *not* pass the optional argument. In this case the placement of the float can be changed using the `\floatplacement` command of the `float` package. I have defined this key instead of advertising `\floatplacement` because `\floatplacement` does not allow the value `H`.

- `align = <code>` ^(sto)

Initial value: `\centering`.

\TeX code which is inserted at the beginning of the `<type>` environment.

- `exec = <code>` ^(sto) / `exec += <code>` ^(exe)

Initial value: empty.

\TeX code which is inserted at the beginning of the `<type>` environment before align. Can be used to define a command for this object, see section 1.5.

- `graphic <option> = <value>` ^(unk)

Is applied to `\includegraphicobject` and `\includegraphicsubobject`. Is ignored for other objects.

`<option>` can be any key which is unique to one of these two commands and any key allowed by the `\includegraphics` command (see `graphicx/graphbox` package). Unlike `\setkeys{Gin}{<options>}` this works with all keys (compare `graphicx` documentation [6, section 4.6], unfortunately it's not getting more specific than "Most of the keyval keys").

I am checking if the key is existing immediately but I cannot check the value (only whether it is required). Therefore if you pass a wrong value the error message will not appear where you set this option but at the object where it is applied.

If you set `graphic width` globally and want to override it locally you can use `graphic width=!`. This is a feature of the `graphicx` package but it is not well documented in it's documentation [6]. (Which is why I am mentioning it here.) The exclamation mark is mentioned for the `\resizebox` command.

- `env = <env>` ^(sto)

Initial value: empty.

The name of an additional inner environment in which the body is wrapped, e.g. `tabular`, `tabularx`, `tikzpicture`. If empty the body is *not* wrapped in another environment (additional to object).

Please note that using this option can lead to difficult to find errors with confusing error messages if you forget that you used it or it has a different value than you think it has. In this case `show env args` may help you.

Please note that due to the way how environments are implemented in $\text{\LaTeX}2$ (this will change in $\text{\LaTeX}3$ [7]) it is not possible to check whether a given name is an environment or a command. But if you pass something that is *not* defined you will get an error.

If you have loaded the `longtable` package (either with the package option `longtable` or with a `\usepackage{longtable}`) you can set the value of this key to `longtable`. In that case the necessary changes are performed so that the content of this object environment is set in a `longtable` environment and does *not* float but can span across page breaks. In this case `type`, `placement` and `align` are ignored.

- `<env> arg = <value>` ^(unk)

The value is wrapped in braces and passed as argument to the additional inner environment if the value of `env` is not empty and `<env>` equals the value of `env`. Arguments to this environment can be given as an argument to the `*object` environment as well but this key provides the possibility to pass arguments on a global level (or to override a globally passed argument). For example this can be used to give all `tabularx`-tables a consistent width:

```

% in preamble
\objectset[table]{tabularx arg=.8\linewidth}

% in document
\begin{tableobject}{caption=Test Table, label=tab1,
↪ env=tabularx}{XX}
...
\end{tableobject}

```

- `<env> args = <value>` ^(unk)

Same like `<env> arg` except that the value is *not* wrapped in braces. This can be used to pass several arguments or an optional argument. Please note that this key cannot be used to pass exactly one undelimited argument consisting of more (or less) than one token because `\pgfkeys` (which I am using internally) strips several levels of braces.

- `arg = <value>` ^(unk)

If `env` has a non-empty value this is an abbreviation of `<env> arg` where `<env>` is the value of `env`.

Please note that because this key depends on the value of another key the order in which these two keys are given is important.

The value of `env` is considered when this key is evaluated. If you use `\objectset[<styles>]{<options>}` (with it's optional argument) the processing of the keys is delayed but it makes some basic error handling already so that the line numbers are as fitting as possible. For this error handling only the options passed to this call of the command are considered. (Trying to consider previously set values correctly would make things more difficult because you might be applying these options to several styles at once where one might have `env` set and another not.) Therefore the following causes an error message:

```

\objectset[table]{env=tabularx}
\objectset[table]{arg=.8\linewidth}

```

While this would not:

```

\objectset{env=tabularx}
\objectset{arg=.8\linewidth}

```

Anyway, I recommend to always use this option directly after `env` (if you intend to use it). `env` and it's `args` belong together:

```

\objectset{env=tabularx, arg=.8\linewidth}

```

- `args = <value>` ^(unk)

If `env` has a non-empty value this is an abbreviation of `<env> args` where `<env>` is the value of `env`. The notes on error handling of the `arg` key apply to this key as well.

- `(\env) arg(s) += \value` ^(unk)

A plus sign can be appended to the key (patterns) `\env arg`, `\env args`, `args` and `arg`. In that case a possibly previously passed argument is not overridden but this value is appended to it. For example the following pattern allows to easily switch between `tabular` and `tabularx` tables on a global level:

```
% in preamble
\objectset[table]{tabularx arg=.8\linewidth, env=tabularx}
\newcolumntype{Y}{>{\raggedleft\arraybackslash}X}

% in document
\begin{tableobject}{caption=Test Table, label=tab1,
↔ tabular arg=lr, tabularx arg+=XY}
...
\end{tableobject}
```

- `first head = \code` ^(sto)

Is inserted at the beginning of the object (if `env` is non-empty: inside of the inner environment and after possibly specified `(\env) arg(s)`). If this is not given, `head` is used instead.

- `last foot = \code` ^(sto)

Is inserted at the end of the object (if `env` is non-empty: inside of the inner environment). If this is not given, `foot` is used instead.

- `head = \code` ^(sto)

Initial value: empty.

This value is used for `first head` if `first head` is not given. If `env=longtable` this is the head after a pagebreak inside of the table.

- `foot` ^(sto)

Initial value: empty.

This value is used for `last foot` if `last foot` is not given. If `env=longtable` this is the foot before a pagebreak inside of the table.

- `table head = \code` ^(exe)

This is a convenience key which sets `first head`, `last foot`, `head` and `foot`. The value is the column headers without rules/lines and without the trailing `\`.

- `table break text = \text` ^(sto)

A text put in the `foot` by `table head`.

- `table head style = \code` ^(exe)

Defines how `table head` fills out `first head`, `last foot`, `head` and `foot`.

Initial value:

```

{%
  first head =
    \toprule
    #1 \\\
    \midrule,
  head =
    #1 \\\
    \midrule,
  foot =
    \midrule
    \ifx\object@tableBreakText\@empty
    \else
      \multicolumn{\the\LT@cols}{r@{\relax}
        ↪ {\object@tableBreakText}%
    \fi,
  last foot =
    \bottomrule,
}

```

(Note the curly braces which are required because the value contains commas and equal signs, see section 3.1.3. `\the\LT@cols` is the number of columns of the longtable and `\object@tableBreakText` is the value of `table break text`. Commands containing an `@` in their name are internal commands and can only be used between `\makeatletter` and `\makeatother`, see also [8].)

- `show env args = true|false` (bool)
Default value: `true`. Initial value: `false`.
Show the code which is assembled from the `env` and `(\langle env \rangle) arg(s) (+)` keys before executing it. See section 3.6. Please note that arguments may be given as additional arguments and not as `(\langle env \rangle) arg(s) (+)` like in `\begin{tableobject}{env=tabular}{c1}`. Such arguments are *not* shown by this key. This key applies to subobjects as well.
- `warn no caption = true|false` (bool)
Default value: `true`. Initial value: `true`.
Give a warning if `caption` is *not* given.
- `warn no label = true|false` (bool)
Default value: `true`. Initial value: `true`.
Give a warning if `label` is *not* given.
- `warn other env = true|false` (bool)
Default value: `true`. Initial value: `false`.
Give a warning when `\langle env \rangle args` is given if `env` does not have the value `\langle env \rangle` and the value of `env` is not empty. This applies to subobjects as well.

The `\objectset` command if used with it's optional argument does not set the options immediately but stores them in different macros for different object styles. Therefore if you change this value for certain styles this change

does not affect following `\objectset` commands. Without the optional style argument, however, the change takes effect immediately.

In order to avoid duplicates this warning is printed only where the key is passed by the user and *not* where it is applied implicitly because of a previous `\objectset[styles]{options}`.

- `contains subobjects = true|false` ^(bool) / `sub = true|false` ^(fwd)
Default value: `true`. Initial value: `false`.

Specifies that this object contains subobjects, see section 3.2.4. Is relevant only if `env` is set. The value of `env` is applied to the subobjects instead of this object. This is not executed immediately but only after all options have been processed so that you do not need to pay special attention to pass `env` before `contains subobjects`.

If this is *not* given (or more precisely: if this is false) and the value of `env` is *not* empty I look ahead whether the object contains a subobject. If I find a subobject I pretend you had passed this option and print a warning. I insist on you explicitly passing this option because the lookahead does not work in all situations. It ignores space and `\par` tokens but if there is any other token before the subobject, for example a `\small` to fit two tables side by side which are a little too wide (which may not be the best solution but an easy quick fix) or a `\typeout` for debugging, the lookahead does not find the subobject (possibly) resulting in unpredictable errors. For example if you set `env=tabular` it will most likely complain about an “Illegal pream-token” or about a “Missing number, treated as zero” with `env=tabular*` because the required arguments are missing.

All `(env) arg(s) (+)` options apply to subobjects as well.

Additionally the following options are passed through to the corresponding options of all subobjects inside of this object, they are all forwarding keys. See `subobject` environment.

- `subobject linewidth = dimen` ^(fwd)
- `subobject sep = code` ^(fwd)
- `subobject hor = code` ^(fwd)
- `subobject hor sep (+) = code` ^(fwd)
- `subobject ver = code` ^(fwd)
- `subobject ver sep (+) = code` ^(fwd)
- `subobject exec (+) = code` ^(fwd)
- `subobject env = env` ^(fwd)
- `subcaptionbox` ^(fwd)
- `subcaptionbox inner pos = c|l|r|s|empty` ^(fwd)
- `subpage` ^(fwd)
- `subpage outer pos = c|t|b|T|B|auto|Auto|empty` ^(fwd)

- `subpage height = <dimen>` ^(fwd)
- `subpage inner pos = c|t|b|s|<empty>` ^(fwd)
- `subpage align = <code>` ^(fwd)
- `subobject warn no caption = true|false` ^(fwd)
- `subobject warn no label = true|false` ^(fwd)

3.2.2 figureobject environment

Env `figureobject` Is used for inserting figures. Takes the same options like the `object` environment. It differs in the following initial values:

- `type=figure`

3.2.3 tableobject environment

Env `tableobject` Is used for inserting tables. Takes the same options like the `object` environment. It differs in the following initial values:

- `type=table`

3.2.4 subobject environment

Env `subobject` To be used inside of an `*object` environment if you want to place several images/tables/whatever together. See also `\includegraphicsubobject`.

I recommend to *not* put anything between the subobjects manually so that you can control their positioning with the `hor` and `ver` options. (Spaces after a subobject are ignored but empty lines are not.)

Unlike the `object` environment, `\caption` and `\label` *cannot* be used inside of the subobject environment. Use the `caption` and `label` options instead.

There are two different backends available, both provided by the `subcaption` package. See the `subcaptionbox` and `subpage` keys.

The `subobject` environment has exactly one mandatory argument, a comma separated list of the following options.

The following options correspond to those of an `object`. See section 3.2.1.

- `label = <label>` ^(sto)
- `caption = <text>` ^(sto)
- `list caption = <text>` ^(sto)
(The `subcaption` package disables subcaptions in the list of figures/tables/whatever by default. To enable them use `\captionsetup[sub]{list=true}`.)
- `details = <text>` ^(sto)
- `details sep = <text>` ^(sto)
- `exec = <code>` ^(sto) / `exec += <code>` ^(exe)

- `graphic <option> = <value>` ^(unk)
 (This key is completely useless. It only has a meaning in the context of `\includegraphicsubobject` but there these options can be used directly without the prefix `graphic`. I am allowing it anyway in order to support the same key like in `\objectset` which is supported by `\includegraphicobject` as well.)
- `env = <env>` ^(sto)
 (See also the `contains subobjects` option of the `object` environment.)
- `<<env>> arg(s) (+) = <value>` ^(unk)
 (All values passed to the corresponding keys of the `object` environment apply to this option, too.)
- `warn no caption = true|false` ^(bool)
- `warn no label = true|false` ^(bool)
- `warn other env = true|false` ^(fwd)
- `show env args = true|false` ^(fwd)

The following options are unique for the `subobject` environment:

- `linewidth = <dimen>` ^(sto)
 Initial value: `.5\linewidth`.

The horizontal space available for the subobject. The content of the subobject is centered within this width. If two subobjects displayed side by side have a small width they may appear too far apart from each other with the initial value. Then you can decrease this value so that they come closer together. (With `subcaptionbox` this value may be empty. In that case the subobject takes as much space as it needs and `\linewidth` inside of the subobject is the same like in the parent object.)

If you want to place more than two subobjects side by side you must decrease this value accordingly. Keep in mind that you need to consider the width of `hor sep` as well if you changed it.

Dimensions can be given relative to other dimensions or in numbers. Aside from absolute units like `pt` or `cm` \TeX also recognizes units relative to the current font size: `em` and `ex`. For more information on dimensions see *The \TeX book* [9, chapter 10] or *\TeX by Topic* [2, chapter 8].

- `sep = <code>` ^(sto)
 A separator which is inserted before each subobject except for the first subobject inside of the current parent object.
- `hor = <code>` ^(exe)
 Default value: empty.
 Set the value of `sep` to the value of `hor sep` so that the subobjects are placed side by side. If you pass a value the value will be appended to `sep` after setting it to `hor sep`.

Please note that options are only valid until the end of a group. Therefore if you use this inside of a subobject it does *not* apply for the following subobject. Instead use `subobject hor` on the parent object.

- `hor sep = $\langle code \rangle^{(sto)}$ / hor sep += $\langle code \rangle^{(exe)}$`

Initial value: empty.

The separator to be used if the subobjects are supposed to be placed side by side.

Please note that `hor` must be used *after* setting this key, otherwise this option will not take effect.

- `ver = $\langle code \rangle^{(exe)}$`

Default value: empty.

Set the value of `sep` to the value of `ver sep` so that the subobjects are placed below each other. If you pass a value the value will be appended to `sep` after setting it to `ver sep`.

Please note that options are only valid until the end of a group. Therefore if you use this inside of a subobject it does *not* apply for the following subobject. Instead use `subobject ver` on the parent object.

- `ver sep = $\langle code \rangle^{(sto)}$ / ver sep += $\langle code \rangle^{(exe)}$`

Initial value: `\par\bigskip`.

The separator to be used if the subobjects are supposed to be placed below each other.

Please note that `ver` must be used *after* setting this key, otherwise this option will not take effect.

- `subcaptionbox(exe)`

The `subcaption` package provides several possibilities to insert subobjects. This option tells the subobject environment to use the `\subcaptionbox` command instead of the `subfigure` or `subtable` environment, see option `subpage`. (This key does *not* take a value.)

This option allows to pass an empty value to `linewidth`. It can be useful if you have subobjects with a small width so that you don't need to try different `subobject linewidths`. The example in section 1.3 could be rewritten as following:

```
\documentclass{article}
\usepackage{easyfloats}

\objectset[table]{%
  env = tabular,
  subcaptionbox,
  subobject linewidth =,
  subobject hor = \quad,
}
\captionsetup[sub]{list=true}
```

```

\begin{document}
\begin{tableobject}{contains subobjects,
  caption = Two test tables,
  label = tabs abc 123,
}
  \begin{subobject}{caption=Abc \& 123, arg=rl}
    \toprule
    abc & 123 \\
    de & 45 \\
    f & 6 \\
    \bottomrule
  \end{subobject}
  \begin{subobject}{caption=123 \& abc, arg=lr}
    \toprule
    123 & abc \\
    45 & de \\
    6 & f \\
    \bottomrule
  \end{subobject}
\end{tableobject}
\end{document}

```

Note that this works only if the subobject captions are very short. If they are wider than the subobjects the line breaks which looks ugly.

If you want to use this option with `env=tabular` (or similar) you must pass the column specification with the option `arg=lr` (instead of as a separate argument). Otherwise you will get the error message “Package array Error: Illegal pream-token (\BODY): ‘c’ used.”

This option is *not* compatible with `env=tabularx` and does not allow verbatim content inside of the subobject.

- `subcaptionbox inner pos = c|l|r|s|<empty>` ^(sto)

The horizontal position of the content in the box. Also allowed is any justification defined with `\DeclareCaptionJustification` (see the `caption` package documentation). An empty value means that this optional argument is *not* passed to the `\subcaptionbox` command. This option has no effect if `linewidth` is empty. I discourage using this option because it destroys the alignment of (sub)object and (sub)caption.

- `subpage` ^(exe)

This is (after `subcaptionbox`) the second and nowadays initial backend for the `subobject` environment. It uses the `subfigure/subtable` environment defined by the `subcaption` package. (This key does *not* take a value.)

The `subfigure` and `subtable` environments are minipages and take the same arguments which can be set with `linewidth`, `subpage outer pos`, `subpage height` and `subpage inner pos`.

- `subpage outer pos = c|t|b|T|B|auto|Auto|⟨empty⟩` ^(sto)

Initial value: `auto`.

The vertical position of the minipage on the baseline.

Additionally to the values `t`, `c` and `b` supported by the minipage environment the `subcaption` package v1.2 adds the allowed values `T` and `B` and this key also allows the values `auto`, `Auto` and empty.

While `t` and `b` align the top/bottom *baseline* of the content `T` and `B` align the very top/bottom of the content.

`c` aligns the center of the content.

`auto` means `t` if the caption is displayed at the top or `b` if the caption is displayed at the bottom so that the captions are aligned (same behavior like `subcaptionbox`).

If a subobject has neither caption nor label `auto` may not work as expected. Instead `Auto` can be used which is based on `T` and `B` instead of `t` and `b`. Note that `Auto` requires version 1.2 or newer of the `subcaption` package.

Empty is equivalent to `c`.

Invalid values are silently ignored and are equivalent to `c`.

- `subpage height = ⟨dimen⟩` ^(sto)

Initial value: empty.

The height of the minipage. An empty value means that this optional argument is *not* passed to the `subfigure/subtable` environment.

Dimensions can be given relative to other dimensions or in numbers. Aside from absolute units like `pt` or `cm` \TeX also recognizes units relative to the current font size: `em` and `ex`. For more information on dimensions see *The \TeX book* [9, chapter 10] or *\TeX by Topic* [2, chapter 8].

- `subpage inner pos = c|t|b|s|⟨empty⟩` ^(sto)

Initial value: empty.

The vertical position of the content on the minipage. Empty means that this optional argument is *not* passed to the `subfigure/subtable` environment. This option has no effect if `subpage height` is empty.

- `subpage align = ⟨code⟩` ^(sto)

Initial value: `\centering`.

\TeX code which is inserted at the beginning of the `subfigure/subtable` environment.

If you want to change the numbering of subobjects please refer to the `subcaption` package documentation [10, section 5 *The `\DeclareCaptionSubType` command*]. The `subcaption` package is loaded automatically by this package.

3.3 Commands

In this section I am describing the commands defined by this package.

3.3.1 `\includegraphicobject` command

```
\includegraphicobject <filename>
\includegraphicobject [<options>]{<filename>}
\includegraphicobject [<style>][<options>]{<filename>}
```

Is used for inserting graphics from a different file. It is very similar to `graphicx`' `\includegraphics` command, except that the graphic is automatically set in a `figureobject` environment. You can change this by setting the object style with `\graphicobjectstyle` or an additional optional argument given *before* the usual optional argument. The mandatory argument is the same: The name of the graphics file to include *without* the file extension. The optional argument accepts—aside from all the options defined by `graphicx/graphbox`—also all options of the `figureobject` environment. Additionally there are the following unique options:

- `auto caption = true|false` (bool)

Default value: `true`. Initial value: `true`.

If no `caption` is given the file name is used as caption. All underscores in the file name are replaced by `\textunderscore`. This option is intended to be used on a global level but works in the optional argument of this command as well.

- `auto caption strip path = true|false` (bool)

Default value: `true`. Initial value: `false`.

If `auto caption` is true and the file name is used as caption a possibly leading path is stripped (everything before and including the last slash in `<filename>`). This is initially false because I am assuming that in most cases where the path should not be displayed `\graphicspath{{path/}}` would be used.

- `auto label = true|false` (bool)

Default value: `true`. Initial value: `true`.

If no `label` is given the file name is used as label. This option is intended to be used on a global level but works in the optional argument of this command as well.

- `auto label strip path = true|false` (bool)

Default value: `true`. Initial value: `false`.

If `auto label` is true and the file name is used as label a possibly leading path is stripped (everything before and including the last slash in `<filename>`). This is initially false because I am assuming that in most cases where the filename without path is unique `\graphicspath{{path/}}` would be used.

- `warn env = true|false` (bool)

Default value: `true`. Initial value: `true`.

Give a warning if `env` is not empty.

- `no env = true|false` (bool)

Default value: `true`. Initial value: `true`.

Reset `env` to an empty value. This happens after evaluating `warn env`.

You may not use this command inside of an `*object` environment. Otherwise you will get an “object environment may not be nested” error. See also `\includegraphicsubobject`.

3.3.2 `\includegraphicsubobject` command

`\includegraphicsubobject` `\includegraphicsubobject{<filename>}`
`\includegraphicsubobject[<options>]{<filename>}`

To be used if you want to place several graphics from different files in one object.

It takes the same options like `\includegraphicobject` except that it takes options for the `subobject` environment instead of options for the `object` environment. Also it does *not* take the optional `<style>` argument.

You may not use this command outside of an `*object` environment. Otherwise you will get a “subobject environment may not be used outside of an object” error. See also `\includegraphicobject`.

3.3.3 Setting options globally

`\objectset` `\objectset{<options>}`
`\objectset[<styles>]{<options>}`

Sets the passed options for all following objects until the end of the current group. All options of the `object` environment are allowed.

A comma separated list of styles or style groups can be given in an optional argument. In that case the options are not set immediately but appended to the specified style(s). The options are set locally for any following object of the specified style(s) in the same group. Although setting the options is delayed the options are checked immediately so that error messages and warnings point to the line where the option is specified in the code, not where it is technically set. (In order for that to work properly it is important that options are specified with the key name only and not with the full path, see section 3.1.5.) However, the value can usually *not* be checked immediately, only whether it is required or not. Therefore if you pass a wrong value the error message will not appear where you set this option but at the object where it is applied. An exception is the key `env` where the value is checked immediately for plausibility whether it might be the name of an environment.

If `<styles>` is empty or an empty group the options are not applied. No error or warning is printed.

There is a style group called `all` which all styles belong to. `\objectset{<options>}` and `\objectset[all]{<options>}` are mostly equivalent except that the former (without optional argument) is more efficient because it sets the options immediately and the latter (with the optional argument given) is able to override options set for a style.

`\graphicobjectstyle` `\graphicobjectstyle{<style>}` can be used to change the object style used by `\includegraphicobject`. For example, if you have a single table in a file called `catcodes.pdf` you can insert it as following. Alternatively, you can use the optional `<style>` argument.

```

\begingroup
\graphicobjectstyle{table}
\includegraphicobject[caption=Catcodes]{catcodes}
\endgroup

```

`\graphicspath` `\graphicspath{{path/}}`: see `graphicx` package documentation [6, section 4.5].

3.3.4 New object styles and types

This section explains how to define a new object `<style>` in the sense of section 3.1.7. It is *not* about how to define a new `<floatstyle>` which can be used as value for the `float style` key.

`\NewObjectStyle` `\NewObjectStyle{<style>}{<options>}` defines a new environment called `<style>object` analogous to `figureobject` and `tableobject`. `<options>` are set for the new object style as if you had used `\objectset[<style>]{<options>}`. You must always specify the `type`. If this package is loaded without `allowstandardfloats` the float environment which is passed to `type` is redefined to issue a warning that `<style>object` should be used instead. This warning should not influence the environment's usual behavior. If the float environment was already passed as `type` to a previous call of `\NewObjectStyle` it is not redefined again but `<style>object` is appended to the list of replacement suggestions.

If you define a new object style you may also want to define a new float type. The float package (which is automatically loaded by this package) defines the following command for doing so:

`\newfloat` `\newfloat{<type>}{<placement>}{<ext>}[<within>]`

- `<type>` is the floating environment to be defined. This value is also used as the float name which is displayed in front of the caption, therefore it should be capitalized. Alternatively the name can be changed using `\floatname{<type>}{<name>}`.
- `<placement>` is the value to be used if the `placement` key is not given (or has an empty value). This is initially `tbp` for the standard float types.
- `<ext>` is the extension of a file used to save the list of `<type>`s. This is `lof` (list of figures) for `type=figure` and `lot` (list of tables) for `type=table`. This file extension should be unique.
- `<within>` is a counter whose value is prepended to the `<type>` counter. The `<type>` counter is reset every time the `<within>` counter is incremented.
- Make sure an appropriate default float style is active when using `\newfloat`. The default float style can be activated using `\floatstyle{<floatstyle>}`, see the float package documentation [11]. It should be `plain` for something like an image or `plaintop` for something like a table. The reasoning is explained in [4]. Alternatively you can specify the float style using the `float style` key in the `<options>` of `\NewObjectStyle`.

`\NewObjectStyle` automatically defines the corresponding environment needed for `subobject` if possible, i.e. if the `caption` package is new enough. If the `caption` package is older than August 30, 2020 and you want to use subobjects you need

to define the subtype manually by putting the following line *before* loading this package [12]:

```
\AtBeginDocument{\DeclareCaptionSubType{<type>}}
```

`\trivfloat` The `trivfloat` package provides the `\trivfloat{<type>}` command which is an easier alternative to `\newfloat`. If you use it you should be aware that it does not define the new float type environment immediately but at `\begin{document}`. This does *not* affect `\NewObjectStyle` (you can still use it directly afterwards) but it means that the float style active at `\begin{document}` is applied and not the float style active at `\trivfloat`. Therefore I recommend to pass the `float style` option to `\NewObjectStyle`, then it does not matter which float style was active when the float type was defined because it is restyled before each use of an object where this option applies. `\trivfloat` must be used before `\AtBeginDocument{\DeclareCaptionSubType{<type>}}`.

`\DeclareFloatingEnvironment` The `newfloat` package provides the `\DeclareFloatingEnvironment[<options>]{<type>}` command which is a newer alternative to `\newfloat` and `\trivfloat`. With its key=value options it is more intuitive than `\newfloat` and more flexible than `\trivfloat`. Unlike `\newfloat` and `\trivfloat` it automatically capitalizes `<type>` before using it as float name. It seems to ignore `\floatstyle` so you need to specify that in the options. The `newfloat` package is written by the same author like the `subcaption` package so you don't need to worry about defining subtypes manually.

3.3.5 New object style groups

Several object styles can be combined to a group. You can set options for all styles contained in a group using `\objectset[<group>]{<options>}`.

`\NewObjectStyleGroup` `\NewObjectStyleGroup{<group>}{<styles*>}` defines a new style group consisting of the styles `<styles*>`. `<styles*>` is a comma separated list of styles. In contrast to `<styles>` it may *not* contain style groups.

`\AddObjectStyleToGroup` `\AddObjectStyleToGroup{<group>}{<style>}` adds an existing style to an existing group.

3.3.6 Hooks

This package provides several commands similar to `\AtBeginDocument` which take one argument, TeX code which is executed at a later point in time.

`\AtBeginObject` `\AtBeginObject{<code>}` runs `<code>` every time at the begin of an object environment (including `figureobject`, `tableobject` and `\includegraphicobject`). This hook is inside of the group but before any options are processed.

`\AtBeginSubobject` `\AtBeginSubobject{<code>}` runs `<code>` every time at the begin of a subobject environment (including `\includegraphicsubobject`). This hook is inside of the group but before any options are processed.

`\AtBeginGraphicObject` `\AtBeginGraphicObject{<code>}` runs `<code>` every time in `\includegraphicobject` and `\includegraphicsubobject`. This hook is after the object/subobject hook but before any options are processed.

3.4 Initialization

This package uses the `float` package to restyle `table` to `plaintop` and `figure` to `plain` so that captions of tables appear always above the table and captions of figures always below the figure. The reasoning is explained in [4]. If you really want to place captions differently you can do that with `\restylefloat` (see `float` package documentation [11]) or by setting the `float style` option. However, I would advice to rethink why you would want to do that.

Unless this package is loaded with the `allowstandardfloats` option it redefines the `table` and `figure` environments to issue a warning if they are used directly. This warning should not influence their usual behavior, though. Instead of `table/figure` you should use `tableobject/figureobject` or `\includegraphicobject`, otherwise this package cannot help you.

Unless this package is loaded with the `nographic` option it loads the `graphicx` package in order to include graphics. It also guarantees that the paper size of the generated pdf matches L^AT_EX' point of view (instead of depending on the system settings).

Unless this package is loaded with the `noarray` option it loads the `array` package which defines additional column specification features like `>{\prefix}`, `<{\suffix}` and `!{\addcolsep}` and the `\newcolumnmtype{col}[\args]{\spec}` command. It also changes the implementation of how lines (rules) are drawn but that is irrelevant if you use the recommendations given in the `booktabs` package documentation [13, section 2 *The layout of formal tables*]. Loading the `array` package is merely for convenience. This package does not use any of it's features.

Unless this package is loaded with the `nobooktabs` option it loads the `booktabs` package which defines commands for formatting tables, most importantly `\toprule`, `\midrule` and `\bottomrule`. These are used by the `table head` key unless you redefine it using `table head style`.

Other packages loaded by this package are listed in appendix B.

3.5 Package options

The package options are implemented using the standard L^AT_EX package options handling functionality as described in [14]. Therefore they do *not* take any values but consist of keys only. Instead I usually provide two separate keys, one which enables an option and another which disables the option. The keys with a ● are active by default and the keys with a ○ are inactive by default.

- `graphicx` use the `graphicx` package as backend for `\includegraphicobject`.
- `graphbox` use the `graphbox` package as backend for `\includegraphicobject`.
- `nographic` do not load `graphicx` or `graphbox`. If you use this option `\includegraphicobject` and `\includegraphicsubobject` are not defined.

Warning: Without driver specific packages like `graphicx`, `geometry` or `hyperref` the paper size of the resulting pdf depends on the system settings, independent of what you set in L^AT_EX. [15]

- `array` load the `array` package. There is no difference between using this package option or a separate `\usepackage{array}`.
- `noarray` do *not* load the `array` package.
- `booktabs` load the `booktabs` package. There is no difference between using this package option or a separate `\usepackage{booktabs}`.
- `nobooktabs` do *not* load the `booktabs` package. Please note that the `table head` key initially relies on the `booktabs` package. If you want to use it with this package option you need to redefine it with `table head style`.
- `longtable` load the `longtable` package. There is no difference between using this package option or a separate `\usepackage{longtable}`.
- `nolongtable` do *not* load the `longtable` package.
- `allowstandardfloats` do not redefine the `table` and `figure` environments. Without this option they are redefined to issue a warning if they are used directly. This warning should not influence their usual behavior. Instead of `table/figure` you should use `tableobject/figureobject` or `\includegraphicobject`, otherwise this package cannot help you.

3.6 Help

If you get an error message and don't understand where it comes from or the output is different from what you expected the following features may give you a better understanding of what this package is doing. These features are based on the \TeX primitive `\show`.

`\show` `\show` shows (among other information) the parameter text and the replacement text of a macro on the terminal and in the log file. If you use one of the following features you most likely want to know the replacement text which is the part between `->` and the last `.` on the line. In `errorstopmode` mode (i.e. without `--interaction=nonstopmode` which most IDEs pass by default) \TeX stops after `\show` and waits until you confirm that you have read the information and it may proceed by pressing enter. For more information see *TeX by Topic* [2, section 34.1].

Handler `.show value` The `.show value` handler can be used to show the value of a storing key (see `pgfkeys` documentation [3, section 87.4.9 *Handlers for Key Inspection*]). For example:

```
\includegraphicsubobject[sep/.show value]{(filename)}
```

Handler `.show boolean` This package also defines a new handler called `.show boolean` which can be used to show the value of a boolean key. For example:

```
\objectset{warn other env/.show boolean}
```

`\ShowObjectStylesInGroup` `\ShowObjectStylesInGroup{<group>}` shows all object styles which are contained in the given group. The styles are wrapped in curly braces so that I can iterate over them with the \LaTeX command `\@tfor`.

`\ShowObjectStyleOptions` `\ShowObjectStyleOptions{<style>}` shows the options set for a specific style. Please

note that this does *not* show directly set options (i.e. options set by `\objectset` without the optional argument and options in the options argument of the object).

Key `show env args` See also the `show env args` key of the `object` and `subobject` environments.

4 Installation

This package is still very new. If it is not yet contained in your $\text{T}_{\text{E}}\text{X}$ distribution just download the *sty-file* and put it next to your main document.

5 Bug reports and contributions

If you find a bug please open an issue for it on <https://gitlab.com/erzo/latex-easyfloats/-/issues> including a minimal example where the bug occurs, an explanation of what you expected to happen and the version of $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ and the packages you are using (which are included in the log file). Issues which are not reproducible will be closed.

If you have a feature request please open an issue for it on <https://gitlab.com/erzo/latex-easyfloats/-/issues> including a minimal example which you would like to work, an explanation of what it should do and a use case explaining why this would be useful.

Before opening an issue please check that there is not yet an issue for it already.

If you want to resolve an issue yourself please create a merge request. Make the changes in *easyfloats.dtx*. You can generate the sty file with `tex easyfloats.ins` but you do not need to do that manually because *test/autotest.py* does that automatically for you. Before creating a merge request please make sure that the automated tests still pass. Run the python3 script *test/autotest.py* from the project root or test directory without arguments. While running the tests it shows a progress bar in square brackets. A dot stands for a successful test, an F for a failed test and an E for an error in the test script. Merge requests where a test prints F will most likely be rejected. If you get an E please create a bug report issue.

Please use *tabs* for indentation.

A merge request should include:

- The changes to *easyfloats.dtx*
- The automatically generated *easyfloats.sty*
- Additions to the documentation
- Automated tests in the *test* directory to make sure the new feature or bug fix does not break in the future
- A link in the merge request description to the issue which it is supposed to close

6 License

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The examples and tests are distributed under the *WTFPL*, version 2 or later. See *test/license.txt*.

A Motivation

In this section I will explain how to insert figures and tables in standard L^AT_EX without this package and how this package can improve that. If you are only interested in how to use this package not why, see section 1 for examples and section 3 for an explanation of the commands, environments and options defined by this package.

A.1 Graphics

Inserting a graphic without using this package requires 6 lines of code (`graphicx` or `graphbox` must be loaded for `\includegraphics`):

```
1 \begin{figure}
2   \centering
3   \includegraphics[graphic width=.8\linewidth]{ctan_lion}
4   \caption{CTAN lion drawing by Duane Bibby}
5   \label{ctan_lion}
6 \end{figure}
```

Lines 1 and 6 open/close a floating environment. The content of this environment can float around so that it won't cause a bad page break. You don't need this if you really just want to insert a graphic exactly here (like a logo in a header) but a graphic cannot break across pages so if it is too large for the end of the current page it will move to the next page leaving the end of this page empty. This is a waste of paper and may confuse a reader by suggesting this might be the end of a chapter. A floating environment can help you by putting the figure where it fits best.

The placement determines where a float is allowed to be placed. Initially that's the top or bottom of a text page or a separate page just for floats. The placement can be specified for a single floating object by passing an optional argument to the floating environment or for all floating objects using the `\floatplacement` command defined by the `float` package. (The floating environments `figure` and `table` are standard L^AT_EX and do not require the `float` package.) The allowed values for the placement are described in the description of the `object` environment's `placement` key.

There are people who are concerned that a figure not sitting at the exact position might confuse a reader. However, a graphic naturally attracts the reader’s attention. Therefore it does not matter where it is located on the double page. The reader will see it.

Of course the author must ensure that the figure does not float too far away. If that is the case changing the size of this or another graphic, `\usepackage[section]{placeins}`, `\FloatBarrier` (defined by the `placeins` package), moving this block of lines in the code, changing the placement or tweaking the parameters which govern the placing of floats [5, page 28] can help.

Line 2 centers the graphic horizontally on the line.

The `\centering` command is used instead of the `center` environment because the latter would insert additional vertical space.

```
\begin{center}
...
\end{center}
```

is in L^AT_EX²¹ (somewhat simplified²) equivalent to

```
\begingroup
\center
...
\endcenter
\endgroup
```

This means that if you accidentally try to use `\centering` as an environment instead of a command you will *not* get an error. You might expect to get an error at least for `\endcentering` not being defined but the T_EX primitive `\csname` which is used to produce the `\endcentering` token instead defines it to `\relax`, a no operation.

The output, however, will not be as desired: the group is closed before the end of the paragraph and `\centering` is forgotten before it can take effect.

Line 3 inserts the graphic. This requires the `graphicx` or `graphbox` package.

If you want all graphics to have the same width you can set the `width` globally with `\setkeys{Gin}{width=<dimen>}`. However, that does not work with all options. Unfortunately the `graphicx` package documentation [6, section 4.6] is not getting more specific than that this works with “Most of the keyval keys”.

Line 4 inserts the caption.

Captions for a figure should be placed *below* the figure. Captions for a table should be placed *above* the table. [4]

¹This will change in L^AT_EX³ [7].

²`\begin` checks that it’s argument is defined, `\end` checks that it’s argument matches that of `\begin` and deals with `\ignorespacesafterend` and `\@endparenv`. Since 2019/10/01 `\begin` and `\end` are robust. Since 2020/10/01 they include hooks. [16, section *ltmiscen.dtx*]

`\caption` can be used inside of a floating environment only. If you need a caption for a non-floating object you can either use `\captionof{<type>}{<caption>}` defined by the `capt-of` or `caption` package or use a floating environment with the placement `H` defined by the `float` package. Although the placement can usually be set globally with `\floatplacement` that does *not* work with `H`.

Line 5 defines a label. This is not visible in the output but can be referenced using `\ref{<label>}` or `\pageref{<label>}`. You might want to consider using the `cleveref` package for references.

The label must be set inside of or after the caption. A label always refers to the last `\refstepcounter` inside of the current group. [16, section *ltxref.dtx*] `\refstepcounter` is used for example by `\caption` and `\section`. Therefore if you use `\label` after the caption it refers to the caption. If you use it before the caption it refers to the current section/subsection/subsubsection.

There are many things that a beginner can do wrong without even getting a warning. Three out of this six lines are always the same (lines 1, 2 and 6). I don't want to always write them out. There is no way to easily switch floating on or off globally.

* * *

This package reduces these six lines to a single command and loads `graphicx` automatically (unless this package is loaded with the `nographic` option).

```
\includegraphics[%
  caption = CTAN lion drawing by Duane Bibby,
  graphic width = .8\linewidth,
]{ctan_lion}
```

The floating environment is applied automatically. It can be changed using the `type` key but I discourage doing so manually. Instead I recommend to use the separate optional `<style>` argument if necessary. If you do not want the object to float you can pass `placement=H`. This works also globally with `\objectset`.

`\centering` is applied automatically. It can be changed using the `align` key.

You can set any of the options passed to the `\includegraphics` command globally using:

```
\objectset[figure]{graphic width=.8\linewidth}
```

Caption and label can be passed as options. Which one is specified first makes no difference. I recommend to stick with caption first in case you ever need to work without this package and to not confuse other people who are not familiar with this package. If you omit one of them the file name is used. See `auto label`, `auto caption`, `auto label strip path` and `auto caption strip path`.

Whether the caption is put above or below the object is specified by the `float style`.


```

\begin{tableobject}{%
  caption = Some catcodes,
  label = catcodes,
  env = tabular,
  arg = cl,
  table head = Catcode & Meaning,
}
  0      & Escape Character  \\
  1      & Begin Group           \\
  2      & End Group              \\
  \vdots & \quad \vdots          \\
\end{tableobject}

```

Also we gain the possibility to easily switch between different tabular-like environments, see section 1.4 and the example given for the `(env) arg(s) + key` in section 3.2.1.

A.3 Subobjects

There are several packages to combine several figures/tables into a single floating environment. *Das L^AT_EX 2_ε-Sündenregister* [18] recommends using `subcaption` over `subfig` and the long deprecated `subfigure`.

The `subcaption` package provides several ways to do this. The first one is using the `\subcaptionbox` command.

```

1 \begin{table}
2   \centering
3   \caption{Category and character codes}
4   \label{codes}
5   \subcaptionbox{Category codes\label{catcodes}}{%
6     \begin{tabular}{cl}
7       \toprule
8       Catcode & Category           \\
9       \midrule
10      0      & Escape Character  \\
11      1      & Begin Group       \\
12      2      & End Group         \\
13      \vdots & \quad \vdots     \\
14      \bottomrule
15    \end{tabular}%
16  }%
17  \quad
18  \subcaptionbox{Character codes\label{charcodes}}{%
19    \begin{tabular}{cr<\hspace{1.3em}}
20      \toprule
21      Character      & \multicolumn1c{Charcode} \\
22      \midrule
23      \textbackslash & \number`\\
24      \{             & \number`\{
25      \}             & \number`\}

```

```

26             \vdots          & \vdots \phantom{0}      \\
27             \bottomrule
28         \end{tabular}%
29     }%
30 \end{table}

```

As the subobjects are inside of an argument they cannot contain code which relies on changing catcodes e.g. `\verb`. Aside from that it just doesn't seem elegant to put an environment inside of an argument.

If you accidentally put the label in the second argument of `\subcaptionbox` instead of in the first it refers to the parent object instead of the subobject and you won't get an error or a warning for that.

Note how I have commented out line breaks in order to avoid undesired spaces.

The second way is to use the `subfigure/subtable` environment. Because the subobject is not inside of an argument it is possible to use `\verb`.

```

1 \begin{table}
2   \caption{Category and character codes}
3   \label{codes}
4   \begin{subtable}{.5\linewidth}
5     \centering
6     \caption{Category codes}
7     \label{catcodes}
8     \begin{tabular}{cl}
9       \toprule
10      Catcode & Category          \\
11      \midrule
12      0      & Escape Character \\
13      1      & Begin Group      \\
14      2      & End Group        \\
15      \vdots & \quad \vdots    \\
16      \bottomrule
17    \end{tabular}%
18  \end{subtable}%
19  \begin{subtable}{.5\linewidth}
20    \centering
21    \caption{Character codes}
22    \label{charcodes}
23    \begin{tabular}{cr<{\hspace{1.3em}}}& \\
24      \toprule
25      Character & \multicolumn1c{Charcode} \\
26      \midrule
27      \verb|\| & \number`\\          \\
28      \verb|{| & \number`{\         \\
29      \verb|}| & \number`\}         \\
30      \vdots   & \vdots \phantom{0} \\
31      \bottomrule
32    \end{tabular}%
33  \end{subtable}%

```

34 `\end{table}`

But why having different environments for subfigures and subtables? The floating environment specifies the type already.

These environments are based on a minipage and require you to always explicitly specify the width of this minipage. On the one hand I don't want to always type that out. On the other hand I want to be able to change the width once for all subobjects for easier consistency.

Caption and label must be placed correctly, see appendix A.1. Even if you restyle the floating environment to always put the caption at the top or bottom using the `float` package this does *not* apply to subobjects.

It is important to comment out line breaks because the widths of the two minipages add up to the line width, a space between them would cause an overfull hbox or a line break.

We need two `\centerings`, one for each subobject. Remember what I said about `\centering` and `center` in appendix A.1.

* * *

This package defines an environment called `subobject` which is a unified wrapper around `\subcaptionbox` and `subfigure/subtable`. Which of these two backends should be used can be specified with the `subcaptionbox` and `subpage` options. `subpage` is used by default so that you can usually use `\verb` in the content.

`subobject` can be used inside of any `*object` environment. If you define a new object environment with `\NewObjectStyle` it defines a corresponding subpage environment like `subfigure/subtable` if it does not exist already and if the `caption` package is new enough. If the `caption` package is older than August 30, 2020 you need to define the subtype manually by putting the following line *before* loading this package [12]:

```
\AtBeginDocument{\DeclareCaptionSubType{<type>}}
```

You don't need to write out the width, `.5\linewidth` is used automatically. You can change this value for all subobjects using

```
\objectset{subobject linewidth=<dimen>}
```

Caption and label are given as options like for `tableobject`. Their order does not matter. They are placed above or below the subobject based on the internal command `\caption@iftop` defined by the `caption` package.

Spaces after `\begin{subobject}` and before and after `\end{subobject}` are ignored so you don't need to comment out the line breaks.³ Just make sure you don't have an empty line between the subobject environments. That would *not* be ignored.

`\centering` is inserted automatically. It can be changed with `subpage align`.

³Actually, spaces after `\begin{subobject}` and before `\end{subobject}` are ignored only if `env` is empty. But if `env` is not empty I am expecting it to be a tabular-like environment where spaces are ignored at the beginning and end of a cell or a `tikzpicture` where spaces are ignored as well. Spaces after `\end{subobject}` are ignored regardless of `env`.

```

\begin{tableobject}{caption=Category and character codes,
↪ label=codes, env=tabular, sub}
  \begin{subobject}{caption=Category codes, label=catcodes}{cl}
    \toprule
      Catcode & Category          \\
    \midrule
      0      & Escape Character \\
      1      & Begin Group      \\
      2      & End Group        \\
      \vdots & \quad \vdots    \\
    \bottomrule
  \end{subobject}
  \begin{subobject}{caption=Character codes, label=charcodes}
↪ {cr<{\hspace{1.3em}}}
    \toprule
      Character & \multicolumn{1}{Charcode} \\
    \midrule
      \verb|\| & \number`\\           \\
      \verb|{| & \number`{\           \\
      \verb|}| & \number`}\           \\
      \vdots   & \vdots \phantom{0}  \\
    \bottomrule
  \end{subobject}
\end{tableobject}

```

A separator for the subobjects could be defined globally using `sep`, see also `hor` and `ver`.

For including a graphic from an external file this package defines a wrapper command around `subobject` and `\includegraphics` in order to reduce the typing effort:

```

\begin{figureobject}{caption=Two lions, label=lions, sub}
  \includegraphicsubobject[caption=A lion]{lion-1}
  \includegraphicsubobject[caption=Another lion]{lion-2}
\end{figureobject}

```

B Used packages

This package uses the following packages (but depending on the package options it may load more or less packages, see section 3.5):

- `float` for `placement=H` and `float style`. It also gives you the possibility to define new float types.
- `caption` In the standard document classes there is no distance at all between a table and its caption above. The `caption` package fixes this. It also defines the `\phantomcaption` command which I am using in case that no caption is given. (The documentation of `\phantomcaption` is in the `subcaption` package.) It also gives you the possibility to customize the layout of captions but I am not changing the default layout. And it is a dependency of the `subcaption`

package.

- `subcaption` for subobjects
- `graphicx/graphbox` for inserting graphics (see `\includegraphicobject`)
- `pgfkeys` for parsing key=value lists
- `etoolbox` is a collection of small helpers for programming.
- `environ` to define environments which save their content in a macro. I am using this for the `subcaptionbox` backend of the `subobject` environment.

C Other packages

Other useful packages for dealing with figures or tables:

- `placeins` When loaded with the `section` package option it prevents floats from floating to another section. It provides the `\FloatBarrier` command which prevents floats from floating past a certain point.
- `flafter` ensures that floats are not placed before their inclusion in the source code. (With the `placement=t` it is possible that they are placed on the top of the same page.)
- `booktabs` for formatting tables
- `xcolor` When loaded with the package option `table` it provides commands for coloring tables.
 - `\rowcolor{<color>}` sets a background color for a single row. See section 1.5.
 - `\rowcolors{<firstrow>}{<oddcolor>}{<evencolor>}` can be used with the `exec` key and sets alternating row colors for the entire table.
- `array` extends the column specification syntax and defines the `\newcolumntype` command to define custom column types. Also changes the approach how rules are drawn but that is irrelevant if you apply `booktabs`' guidelines [13, section 2 *The layout of formal tables*].
- `siunitx` for typesetting numbers and units. It provides the `S` column to align numbers at their decimal separator.
- `tabularx` A table where the columns adapt to the width of the table, not the other way around. Unlike `tabular*` the space goes into the columns, not between the columns.
- `longtable` provides tables where a pagebreak is allowed, see section 1.4
- `hyperref` automatically creates links in the pdf document for example from references to floating objects. With the package option `pdfusetitle` it automatically sets the pdf title and author based on `\title` and `\author`.
- `cleveref` to reference an object. In contrast to the standard `\ref` and `\pageref`, `\cref` and `\cpageref` automatically detect the type of object and can handle multiple references at once. With the `nameinlink` package option the object type in front of the number becomes part of the link created by

hyperref (i.e. the link is “figure 1” instead of “1” and “figure ” being before the link.) With the `noabbrev` option references are not abbreviated (by default references are abbreviated but only the lower case variants, not the upper case variants which seems inconsistent to me. Abbreviating at the beginning of a sentence is considered bad style [19].)

- `biblatex` If you input graphics you need to specify the source. Biblatex creates an entire bibliography for you.
- `tikz` is an amazingly powerful package to create your own graphics in \LaTeX .
- `newfloat` provides a more modern command to define new floating environments than the `float` package.

For more information about floats see <https://latexref.xyz/Floats.html> (it seems this is an html version of the above quoted pdf [5]).

D References

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