Manual for version 3.40 (2015/01/14)

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Abstract

tcolorbox provides an environment for colored and framed text boxes with a heading line. Optionally, such a box can be split in an upper and a lower part. The package tcolorbox can be used for the setting of \LaTeX\ examples where one part of the box displays the source code and the other part shows the output. Another common use case is the setting of theorems. The package supports saving and reuse of source code and text parts.
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1 Introduction

The package originates from the first edition of my book «\textit{\LaTeX{} – Einführung in das Textsatzsystem}» [19] in about 2006. For the \LaTeX{} examples and tutorials given there, I wanted to have accentuated and colored boxes to display source code and compiled text in combination. Since, in my opinion, this type of boxes is also quite useful to highlight definitions and theorems, I applied them for my lecture notes in mathematics [16–18] as well. With this package, you are invited to apply these boxes for similar projects.

Starting with version 2.00, for all internal calculations $\varepsilon$-\TeX{} [2] expressions are used in replacement of the package \texttt{calc} [21]. The breaking news for version 2.00 is the support for breakable boxes. This new feature allows new applications of the package without affecting the core package too much if you do not need boxes to break automatically. With version 2.20, the often requested 'side by side' mode for listings has been added. With version 3.00, boxed titles are introduced together with improved customization options for overlays, underlays, finishes, and own code extensions.

Since the first public release in 2011, I received a lot of feedback from all over the world. I want to thank all who wrote me for supporting this package by sending bug reports and ideas for new or better features.

1.1 Installation

Typically, \texttt{tcolorbox} will be installed as part of a major \LaTeX{} distribution and there is nothing special to do for a user.

If you intend to make a local installation by hand, see the \texttt{README} file of the \texttt{tcolorbox} package for some hints. The short story is: you have to install not only \texttt{tcolorbox.sty}, but also all \texttt{*.code.tex} files in the local \texttt{texmf} tree.

1.2 Loading the Package

The base package \texttt{tcolorbox} loads the packages \texttt{pgf} [20], \texttt{verbatim} [15], \texttt{etoolbox} [7], and \texttt{environ} [13]. \texttt{tcolorbox} itself is loaded in the usual manner in the preamble:

\begin{verbatim}
\usepackage{tcolorbox}
\end{verbatim}

The package takes option keys in the key-value syntax. Alternatively, you may use these keys later in the preamble with \texttt{\tcbuselibrary*P.8} (see there). For example, the key to typeset listings is:

\begin{verbatim}
\usepackage[listings]{tcolorbox}
\end{verbatim}
1.3 Libraries

The base package \texttt{tcolorbox} is extendable by program libraries. This is done by using option keys while loading the package or inside the preamble by applying the following macro with the same set of keys.

\begin{verbatim}
\tcbuselibrary\{⟨key list⟩\}
\end{verbatim}

Loads the libraries given by the \texttt{⟨key list⟩}.

The following keys are used inside \texttt{\tcbuselibrary} respectively \texttt{\usepackage} without the key tree path /tcb/library/.

\begin{itemize}
\item \texttt{/tcb/library/skins}\quad\texttt{\usepackage} skins
  \begin{itemize}
  \item Loads the package \texttt{tikz}\ [20] and provides additional styles (skins) for the appearance of the colored boxes; see Section 9 from page 117.
  \end{itemize}
\item \texttt{/tcb/library/raster}\quad\texttt{\usepackage} raster
  \begin{itemize}
  \item Provides additional macros and options for typesetting multiple boxes arranged in a kind of raster; see Section 12 from page 222.
  \end{itemize}
\item \texttt{/tcb/library/listings}\quad\texttt{\usepackage} listings
  \begin{itemize}
  \item Loads the package \texttt{listings}\ [6] and provides additional macros for typesetting listings which are described in Section 13 from page 233.
  \end{itemize}
\item \texttt{/tcb/library/listingsutf8}\quad\texttt{\usepackage} listingsutf8
  \begin{itemize}
  \item Loads the packages \texttt{listings}\ [6] and \texttt{listingsutf8}\ [10] for UTF-8 support. This is a variant of the library \texttt{listings} and is described in Section 13 from page 233.
  \end{itemize}
\item \texttt{/tcb/library/minted}\quad\texttt{\usepackage} minted
  \begin{itemize}
  \item Loads the package \texttt{minted}\ [14] to typeset listings with the \texttt{Pygments}\ [12] tool, also see Section 13 on page 233.
  \end{itemize}
\item \texttt{/tcb/library/theorems}\quad\texttt{\usepackage} theorems
  \begin{itemize}
  \item Provides additional macros for typesetting theorems which are described in Section 14 from page 272.
  \end{itemize}
\item \texttt{/tcb/library/breakable}\quad\texttt{\usepackage} breakable
  \begin{itemize}
  \item Provides support for automatic box breaking from one page to another; see Section 15 from page 295.
  \end{itemize}
\item \texttt{/tcb/library/fitting}\quad\texttt{\usepackage} fitting
  \begin{itemize}
  \item Provides support for font size adaption of the box content to the box dimensions; see Section 16 from page 315.
  \end{itemize}
\item \texttt{/tcb/library/hooks}\quad\texttt{\usepackage} hooks
  \begin{itemize}
  \item Extends several option keys to 'hookable' keys; see Section 17 from page 326.
  \end{itemize}
\item \texttt{/tcb/library/xparse}\quad\texttt{\usepackage} xparse
  \begin{itemize}
  \item Provides document command production with \texttt{xparse} for \texttt{tcolorbox}; see Section 18 from page 336.
  \end{itemize}
\item \texttt{/tcb/library/documentation}\quad\texttt{\usepackage} documentation
  \begin{itemize}
  \item Provides additional macros for typesetting \LaTeX\ documentations which are described in Section 19 from page 349.
  \end{itemize}
\end{itemize}
/tcb/library/many (style, no value)
Loads the libraries \texttt{skins}, \texttt{breakable}, \texttt{raster}, \texttt{hooks}, \texttt{theorems}, \texttt{fitting}, and \texttt{xparse}. Use this shortcut, if you want to use all features of \texttt{tcolorbox} with exception of typesetting listings and using the specialized \texttt{documentation} library.

/tcb/library/most (style, no value)
Loads all libraries except \texttt{minted} and \texttt{documentation}. Use this shortcut, if you want to use all features of \texttt{tcolorbox} with exception of using the \texttt{minted} package and using the specialized \texttt{documentation} library.

/tcb/library/all (style, no value)
Loads all libraries. Use this shortcut only, if you intend to use the \texttt{documentation} library.


3 Macros for Box Creation

\begin{tcolorbox}[(options)]
(environment content)
\end{tcolorbox}

This is the main environment to create an accentuated colored text box with rounded corners and, optionally, two parts. The appearance of this box is controlled by numerous options. In the most simple case the source code

\begin{tcolorbox}
This is a \textbf{tcolorbox}.
\end{tcolorbox}

creates the following compiled text box:

This is a \textbf{tcolorbox}.

The text content of the box can be divided in an upper and a lower part by the command \texttt{\tcb{}lower}. Visually, both parts are separated by a line. For example:

\begin{tcolorbox}
This is another \textbf{tcolorbox}.
\texttt{\tcb{}lower}
Here, you see the lower part of the box.
\end{tcolorbox}

This code gives the following box:

This is another \textbf{tcolorbox}.

Here, you see the lower part of the box.

The (\texttt{options}) control the appearance and several functions of the boxes, see Section 4 on page 17 for the complete list. A quick example is given here:

\begin{tcolorbox}[colback=red!5!white,colframe=red!75!black,title=My nice heading]
This is another \textbf{tcolorbox}.
\texttt{\tcb{}lower}
Here, you see the lower part of the box.
\end{tcolorbox}

My nice heading

This is another \textbf{tcolorbox}.

Here, you see the lower part of the box.

\texttt{\tcb{}lower}

Used inside \texttt{tcolorbox} to separate the upper box part from the optional lower box part. The upper and the lower part are treated as separate functional units. If you only want to draw a line, see \texttt{\tcblin\backtext{e} \textsuperscript{15.172}.}
\tcbset\{\texttt{\langle options \rangle}\}
Sets options for every following \texttt{tcolorbox} inside the current \TeX{} group. By default, this does not apply to nested boxes, see Section 4.16 on page 82. For example, the colors of the boxes may be defined for the whole document by this:
\begin{tcolorbox}
\tcbset\{\texttt{colback=red!5!white, colframe=red!75!black}\}
\end{tcolorbox}

\tcbsetforeverylayer\{\texttt{\langle options \rangle}\}
Sets options for every following \texttt{tcolorbox} inside the current \TeX{} group. In contrast to \texttt{tcbset}, this does also apply to nested boxes, see Section 4.16 on page 82. Technically, the \texttt{\langle options \rangle} are appended to the default values for every \texttt{tcolorbox} which are applied by \texttt{/tcb/reset}.
You should not use this macro, if you are not completely sure that you want to have the \texttt{\langle options \rangle} also for boxes in boxes (in boxes in boxes . . .).
\begin{tcolorbox}
\tcbset\{\texttt{colback=red!5!white}\}
\tcbsetforeverylayer\{\texttt{colframe=red!75!black}\}
\begin{tcolorbox}\[title=All options for this box\]
This is a tcolorbox.\par\medskip
\begin{tcolorbox}\[title=Nested box\]
Note that this nested box has a red frame but no green background.
\end{tcolorbox}
\end{tcolorbox}
\bigskip
\begin{tcolorbox}\[reset\]
Options given with \texttt{\tcbsetforeverylayer} survive a \texttt{\reset}.
\end{tcolorbox}

All options for this box

This is a tcolorbox.

\textbf{Nested box}

Note that this nested box has a red frame but no green background.

Options given with \texttt{\tcbsetforeverylayer} survive a \texttt{\reset}.
\tcolorbox{(options)}{(box content)}

Creates a colored box which is fitted to the width of the given \textit{box content}. In principal, most \textit{(options)} for a \texttt{tcolorbox}\textsuperscript{\texttt{P.}11} can be used for \texttt{tbox} with some restrictions. A \texttt{tbox} cannot have a lower part and cannot be broken.

\begin{tcolorbox}[colframe=blue!50!black,colback=white,colupper=red!50!black,
fonttitle=\textbf,center title]
Text \texttt{tbox}[tbox raise base]{Hello World}\texttt{hfll}
\%
\texttt{tbox}[left=0mm,right=0mm,top=0mm,bottom=0mm,boxsep=0mm,
toptitle=0.5mm,bottomtitle=0.5mm,title=My table]{% \arrayrulecolor{blue!50!black}\renewcommand{\arraystretch}{1.2}\%\begin{tabular}{r|c|l}
One & Two & Three \texttt{\hline} \\
Men & Mice & Lions \texttt{\hline}
Upper & Middle & Lower \texttt{\end{tabular}}%}
\%
\texttt{tbox}[colback=blue!85!black,
left=0mm,right=0mm,top=0mm,bottom=0mm,boxsep=1mm,arc=0mm,boxrule=0.5pt,
title=My picture]{% \includegraphics[width=5cm]{Basilica_5.png}}
\%
\usepackage{tikz}
\tcbset{colframe=blue!50!black,colback=white,colupper=red!50!black,
fonttitle=\textbfseries,center title}
\%
\texttt{Fixed width box}
\begin{tcolorbox}\texttt{Hello}\texttt{World!}\texttt{end{tcolorbox}}
\%
\texttt{Fitted width box (like hbox or makebox)}
\texttt{tbox}\{Hello\texttt{\World!}\}
\%
\texttt{Fitted width box (using a \texttt{tikzname} node)}
\texttt{tbox[tikznode]{Hello\texttt{\World!}}}
\%
\begin{tcolorbox}Hello
World!
\end{tcolorbox}
\begin{tcolorbox}HelloWorld!
\end{tcolorbox}
\begin{tcolorbox}Hello
World!
\end{tcolorbox}
See Section 18.2 on page 338 and Section 18.3 on page 341 for more elaborate methods to create new environments and commands.

\newtcolorbox\lbrack\(\text{{init options}}\)\rbrack\lbrack\(\text{{name}}\)\rbrack\lbrack\(\text{{number}}\)\rbrack\lbrack\(\text{{default}}\)\rbrack\lbrack\(\text{{options}}\)\rbrack

Creates a new environment \(\text{{name}}\) based on \texttt{tcolorbox}\textsuperscript{P.\,11}. Basically, \texttt{\newtcolorbox} operates like \texttt{\newenvironment}. This means, the new environment \(\text{{name}}\) optionally takes \(\text{{number}}\) arguments, where \(\text{{default}}\) is the default value for the optional first argument. The \(\text{{options}}\) are given to the underlying \texttt{tcolorbox}. Note that \texttt{/tcb/savedelimiter}\textsuperscript{P.\,24} is set to the given \(\text{{name}}\) automatically. The \(\text{{init options}}\) allow setting up automatic numbering, see Section 5 from page 92.

\begin{verbatim}
\newtcolorbox{mybox}{colback=red!5!white, colframe=red!75!black}
This is my own box.
\end{mybox}
\end{verbatim}

\begin{verbatim}
\newtcolorbox{mybox}[1]{colback=red!5!white, colframe=red!75!black,fonttitle=\textbf, title=#1}
This is my own box with a mandatory title.
\end{mybox}
\end{verbatim}

\begin{verbatim}
\newtcolorbox{mybox}[2][]{colback=red!5!white, colframe=red!75!black,fonttitle=\textbf, colbacktitle=red!85!black, enhanced, attach boxed title to top center={yshift=-2mm}, title=#2,#1}
\end{verbatim}

\begin{verbatim}
\newtcolorbox{pabox}[auto counter,number within=section]{pabox}[2][]{
  colback=red!5!white, colframe=red!75!black, fonttitle=\textbf, title=Examp.-\thetcbcounter: #2,#1}
\end{verbatim}

\begin{verbatim}
\begin{pabox}{colback=yellow}{Hello there}
This is my own box with a mandatory numbered title and options.
\end{pabox}
\end{verbatim}

\begin{verbatim}
\renewtcolorbox\lbrack\(\text{{init options}}\)\rbrack\lbrack\(\text{{name}}\)\rbrack\lbrack\(\text{{number}}\)\rbrack\lbrack\(\text{{default}}\)\rbrack\lbrack\(\text{{options}}\)\rbrack

Operates like \texttt{\newtcolorbox}, but based on \texttt{\renewenvironment} instead of \texttt{\newenvironment}. An existing environment is redefined.
\newtcbox[\langle \textit{init options} \rangle]{{\langle \textit{name} \rangle}}{{\langle \textit{number} \rangle}}{{\langle \textit{default} \rangle}}{{\langle \textit{options} \rangle}}

Creates a new macro \langle \textit{name} \rangle based on \texttt{tcbox}
\cite[p.13]{p13}. Basically, \newtcbox operates like \texttt{newcommand}. The new macro \langle \textit{name} \rangle optionally takes \langle \textit{number} \rangle+1 arguments, where \langle \textit{default} \rangle is the default value for the optional first argument. The \langle \textit{options} \rangle are given to the underlying \texttt{tcbox}. The \langle \textit{init options} \rangle allow setting up automatic numbering, see Section 5 from page 92.

\begin{verbatim}
\newtcbox\{mybox\}{colback=red!5!white,
colframe=red!75!black}
\mybox\{This is my own box.\}
\end{verbatim}

This is my own box.

\begin{verbatim}
\newtcbox\{mybox\}[1]{colback=red!5!white,
colframe=red!75!black,fonttitle=\bfseries,
title=#1}
\mybox\{Hello there\}\{This is my own box.\}
\end{verbatim}

Hello there

\begin{verbatim}
\newtcbox\{mybox\}[2][]{colback=red!5!white,
colframe=red!75!black,fonttitle=\bfseries,
title=#2,#1}
\mybox\{colback=yellow\}\{Hello there\}%
\{This is my own box.\}
\end{verbatim}

Hello there

\begin{verbatim}
\newtcbox\{mybox\}[1][red]{on line,
arc=0pt,outer arc=0pt,colback=#1!10!white,colframe=#1!50!black,
boxsep=0pt,left=1pt,right=1pt,top=2pt,bottom=2pt,
boxrule=0pt,bottomrule=1pt,toprule=1pt}
\newtcbox\{xmybox\}[1][red]{on line,
arc=7pt,colback=#1!10!white,colframe=#1!50!black,
before upper={\rule[-3pt]{0pt}{10pt}},boxrule=1pt,
boxsep=0pt,left=6pt,right=6pt,top=2pt,bottom=2pt}
\end{verbatim}

The \texttt{mybox}[green]\{quick\} brown \texttt{mybox}[fox]\ \texttt{mybox}[blue]\{jumps\} over the \texttt{mybox}[green]\{lazy\}\ \texttt{mybox}[dog]\. \texttt{par}

The \texttt{xmybox}[green]\{quick\} brown \texttt{xmybox}[fox]\ \texttt{xmybox}[blue]\{jumps\} over the \texttt{xmybox}[green]\{lazy\}\ \texttt{xmybox}[dog]\.

\begin{verbatim}
\renewtcbox[\langle \textit{init options} \rangle]{{\langle \textit{name} \rangle}}{{\langle \textit{number} \rangle}}{{\langle \textit{default} \rangle}}{{\langle \textit{options} \rangle}}
\end{verbatim}

Operates like \texttt{newtcbox}, but based on \texttt{renewcommand} instead of \texttt{newcommand}. An existing macro is redefined.
An existing environment \langle name \rangle is redefined to be boxed inside a \texttt{tcolorbox} with the given \langle options \rangle.

\begin{tcolorboxenvironment}{myitemize}{blanker, before skip=6pt, after skip=6pt, borderline west={3mm}{0pt}{red}}

Some text.
\begin{myitemize}
\item Alpha
\item Beta
\item Gamma
\end{myitemize}
More text.

Some text.
\item Alpha
\item Beta
\item Gamma
More text.

See further examples in Section 14.4 on page 294.
4 Option Keys

For the \langle options\rangle in \texttt{tcolorbox}\textsuperscript{P.11} respectively \texttt{tcbset}\textsuperscript{P.12} the following \texttt{pgf} keys can be applied. The key tree path /tcb/ is not to be used inside these macros. It is easy to add your own style keys using the syntax for \texttt{pgf} keys, see [19, 20] or the examples starting from page 259.

4.1 Title

\texttt{/tcb/title=⟨text⟩} \hfill (no default, initially empty)

Creates a heading line with \langle text\rangle as content.

\begin{tcolorbox}[title=My heading line]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\texttt{/tcb/notitle} \hfill (no value, initially set)

Removes the title line if set before.

\texttt{/tcb/adjusted title=⟨text⟩} \hfill (style, no default, initially unset)

Creates a heading line with \langle text\rangle as content. The minimal height of this line is adjusted to fit the text given by \texttt{/tcb/adjust text}. This option makes sense for single line headings if boxes are set side by side with equal height. Note that it is very easy to trick this adjustment.

\begin{tcolorbox}[colback=White,arc=0mm,width=(\linewidth-4pt)/4, equal height group=AT,before=,after=\hfill,fonttitle=\bfseries]
\textbf{The following titles are not adjusted:}\\
\texttt{\foreach \n in {xxx,ggg,AAA,\textquote{Agypten}}}
{\begin{tcolorbox}[title=\n,colframe=red!75!black]
Some content.\end{tcolorbox}}
\textbf{Now, we try again with adjusted titles:}\\
\texttt{\foreach \n in {xxx,ggg,AAA,\textquote{Agypten}}}
{\begin{tcolorbox}[adjusted title=\n,colframe=blue!75!black]
Some content.\end{tcolorbox}}
\end{tcolorbox}

\begin{itemize}
\item xxx
\item ggg
\item AAA
\item Ägypten
\end{itemize}

\texttt{/tcb/adjust text=⟨text⟩} \hfill (no default, initially Äpgjy)

This sets the reference text for \texttt{/tcb/adjusted title}. If your texts never exceed 'Äpgjy' in depth and height you don’t need to care about this option.

\textbf{My heading line}
This is a \textbf{tcolorbox}.
/tcb/squeezed title=\langle text \rangle (style, no default, initially unset)

Creates a single heading line with \langle text \rangle as content. If the \langle text \rangle is longer than the available space, the text is squeezed to fit into the available space.

\begin{tcbitemize}
\raster columns=3, \raster equal height, \colframe=red!75!black, \colback=red!5!white, \fonttitle=\bfseries
\squeezed title=\langle Short title \rangle
\item First box
\squeezed title=\langle This is a very very long title \rangle
\item Second box
\squeezed title=\langle This title is clearly too long for this application \rangle
\item Third box
\end{tcbitemize}

Short title
First box

This is a very very long title
Second box

This title is clearly too long for this application
Third box

/tcb/squeezed title*=\langle text \rangle (style, no default, initially unset)

This is a combination of /tcb/adjusted title^P.17 and /tcb/squeezed title.

\begin{tcbitemize}
\raster columns=3, \raster equal height, \colframe=red!75!black, \colback=red!5!white, \fonttitle=\bfseries
\squeezed title*=\langle Short title \rangle
\item First box
\squeezed title*=\langle This is a very very long title \rangle
\item Second box
\squeezed title*=\langle This title is clearly too long for this application \rangle
\item Third box
\end{tcbitemize}

Short title
First box

This is a very very long title
Second box

This title is clearly too long for this application
Third box
Detaches the title from its normal position. The text of the title is stored into \texttt{\tcbtitletext} and the formatted title is available by \texttt{\tcbtitile}. The main application is to move the title from its usual place to another one.

\begin{verbatim}
\newtcolorbox{mybox}[2]{
  colbacktitle=red!10!white, colback=blue!10!white,coltitle=red!70!black, title={#2},fonttitle=\bfseries,#1}
\begin{mybox}{My title}
This is a \textbf{tcolorbox}.
\end{mybox}
\begin{mybox}[detach title,before upper={\tcbtitile}]{My title}
This is a \textbf{tcolorbox}.
\end{mybox}
\begin{mybox}[detach title,after upper={\par\hfill\tcbtitile}]{My title}
This is a \textbf{tcolorbox}.
\end{mybox}
\end{verbatim}

Attaches the title to its normal position. This option is used to reverse /tcb/detach title.

\begin{verbatim}
\newtcolorbox{mybox}[2]{
  colbacktitle=red!10!white, colback=blue!10!white,coltitle=red!70!black, title={#2},fonttitle=\bfseries,#1}
\begin{mybox}[attach title to upper={\ ---\ }]{My title}
This is a \textbf{tcolorbox}.
\end{mybox}
\begin{mybox}[attach title to upper,after title={:\ }]{My title}
This is a \textbf{tcolorbox}.
\end{mybox}
\end{verbatim}

More title options are documented in Section 4.10 on page 52 and Section 9.2 on page 124.
4.2 Subtitle

Inside the box content, one or more subtitles can be added. In general, a subtitle is a further \textbf{tcolorbox} \textsuperscript{P.11} which inherits some color and geometry options from the enclosing box. It may be customized just like any other \textbf{tcolorbox} \textsuperscript{P.11}.

\begin{tcolorbox}[title=My title, colback=red!5!white, colframe=red!75!black, fonttitle=\bfseries]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[title=My title, colback=red!5!white, colframe=red!75!black, colbacktitle=yellow!50!red, coltitle=red!25!black, fonttitle=\bfseries]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

Additional \textbf{tcolorbox} with subtitle:

\begin{tcolorbox}[title=My title, colback=red!5!white, colframe=red!75!black, colbacktitle=yellow!50!red, coltitle=red!25!black, fonttitle=\bfseries, subtitle style={boxrule=0.4pt, colback=yellow!50!red!25!white}]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\textbf{tcolorbox} \textsuperscript{P.11} with \textbf{tcb/subtitle style=⟨options⟩} (no default, initially empty)

\begin{tcolorbox}[title=My title, colback=red!5!white, colframe=red!75!black, colbacktitle=yellow!50!red, coltitle=red!25!black, fonttitle=\bfseries, subtitle style=⟨options⟩]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[title=My title, colback=red!5!white, colframe=red!75!black, colbacktitle=yellow!50!red, coltitle=red!25!black, fonttitle=\bfseries]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\textbf{tcolorbox} \textsuperscript{P.11} with \textbf{tcb/subtitle style=⟨options⟩} (no default, initially empty)

\begin{tcolorbox}[title=My title, colback=red!5!white, colframe=red!75!black, colbacktitle=yellow!50!red, coltitle=red!25!black, fonttitle=\bfseries, subtitle style=⟨options⟩]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
4.3 Upper Part

The text content of a \textcolor{box}{P.11} may be parted into a mandatory upper part and an optional lower part. These parts are separated by \textcolor{lower}{P.11}. If there is no \textcolor{lower}{P.11} present, there is no lower part and the upper part forms the complete text content.

\texttt{/tcb/upperbox=⟨mode⟩} (no default, initially visible)

Controls the treatment of the upper part of the box. If there is no lower part, this is the complete text content. Feasible values for ⟨mode⟩ are:

- \texttt{visible}: usual type setting of the upper part,
- \texttt{invisible}: empty space instead of the upper part contents.

\begin{tcolorbox}
\[upperbox=invisible, colback=white\]
This is a \textbf{tcolorbox} (but invisible).
\end{tcolorbox}

\begin{tcolorbox}
\[upperbox=invisible, colback=white\]
This is a \textbf{tcolorbox} (but invisible).
\textcolor{lower}{This is the lower part.}
\end{tcolorbox}

\texttt{/tcb/visible} (style, no value)

Shortcut for setting \texttt{/tcb/upperbox} and \texttt{/tcb/lowerbox} \textcolor{P.22} to be \texttt{visible}.

\texttt{/tcb/invisible} (style, no value)

Shortcut for setting \texttt{/tcb/upperbox} and \texttt{/tcb/lowerbox} \textcolor{P.22} to be \texttt{invisible}.

\begin{tcolorbox}
\[invisible\]
This is a \textbf{tcolorbox} (but invisible).
\end{tcolorbox}
4.4 Lower Part

\texttt{/tcb/\texttt{lowerbox}=(mode)} (no default, initially \texttt{visible})

Controls the treatment of the lower part of the box. Feasible values for \texttt{(mode)} are:

- \texttt{visible}: usual type setting of the lower part,
- \texttt{invisible}: empty space instead of the lower part contents,
- \texttt{ignored}: the lower part is not used (here).

The last two values are usually applied in connection with \texttt{savelowerto}.

\begin{tcolorbox}[lowerbox=invisible,colback=white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

This is the lower part (but invisible).

\begin{tcolorbox}[lowerbox=ignored,colback=white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

This is the lower part (but ignored).

\begin{tcolorbox}[lowerbox=invisible,savelowerto=\jobname bspsave.tex,colback=white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

This is the lower part which may be quite complex: \( f(x) = \frac{1 + x^2}{1 - x^2} \).

Now, we load the saved text:\
\texttt{\input{\jobname bspsave.tex}}
Lower separated

This is the upper part.

This is the lower part.

Lower not separated

This is the upper part.

This is the lower part.

Lower separated

This is the upper part. This is the lower part.

Lower not separated

This is the upper part. This is the lower part.

Lower separated

This is the upper part.

This is the lower part.

Lower not separated

This is the upper part.

This is the lower part.

Lower separated

This is the upper part.

This is the lower part.

Lower not separated

This is the upper part.

This is the lower part.
/tcb/savedelimiter=(name) (no default, initially \tcolorbox)

Used in connection with new environment definitions which extend \tcolorbox and use or allow the option \savelowerto. To catch the end of the new box environment ⟨name⟩ has to be the name of this environment. Additionally, the environment definition has to use \tcolorbox instead of \begin{tcolorbox} and \end{tcolorbox} instead of \end{tcolorbox}.

\begin{tcolorbox}
\newenvironment{mybox}{%1}{%}
  \savelowerto=\jobname_bspsave2.tex,lowerbox=ignored,
  \colback=red!5!white,\colframe=red!75!black,\fonttitle=\bfseries,
  \title=#1}%
\end{tcolorbox}

\begin{mybox}{My Example}
Upper part.
\tcblower
Saved lower part!
\end{mybox}

Now, the saved part is used:
\begin{tcolorbox}[colback=green!5]
\input{\jobname_bspsave2.tex}
\end{tcolorbox}

\begin{mybox}{My Example}
Upper part.
\tcblower
Saved lower part!
\end{mybox}

Now, the saved part is used:
\begin{tcolorbox}[colback=green!5]
\input{\jobname_bspsave2.tex}
\end{tcolorbox}

The savedelimiter is used implicitly with \newtcolorbox which allows a more convenient usage:

\begin{tcolorbox}
\newtcolorbox{mybox}{%1}{%}
  \savelowerto=\jobname_bspsave2.tex,lowerbox=ignored,
  \colback=red!5!white,\colframe=red!75!black,\fonttitle=\bfseries,
  \title=#1}%
\end{tcolorbox}

\begin{mybox}{My Example}
Upper part.
\tcblower
Saved lower part!
\end{mybox}

Now, the saved part is used:
\begin{tcolorbox}[colback=green!5]
\input{\jobname_bspsave2.tex}
\end{tcolorbox}

\begin{mybox}{My Example}
Upper part.
\tcblower
Saved lower part!
\end{mybox}

Now, the saved part is used:
\begin{tcolorbox}[colback=green!5]
\input{\jobname_bspsave2.tex}
\end{tcolorbox}
4.5 Colors and Fonts

\[ \texttt{/tcb/colframe} = \langle \texttt{color} \rangle \] (no default, initially black!75!white)
Sets the frame \langle color \rangle of the box.

\begin{tcolorbox}[colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\[ \texttt{/tcb/colback} = \langle \texttt{color} \rangle \] (no default, initially black!5!white)
Sets the background \langle color \rangle of the box.

\begin{tcolorbox}[colback=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\[ \texttt{/tcb/title filled} = \texttt{true}|\texttt{false}\] (default \texttt{true}, initially \texttt{false})
Switches the drawing of the title background according to the given value. This option is set to \texttt{true} automatically by /tcb/colbacktitle, /tcb/opacitybacktitle \textsuperscript{\texttt{P.43}}, and /tcb/title style \textsuperscript{\texttt{P.120}}, and /tcb/title code \textsuperscript{\texttt{P.111}}.

\begin{tcolorbox}[title=My title, title filled]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[title=My title, title filled=false]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\[ \texttt{/tcb/colbacktitle} = \langle \texttt{color} \rangle \] (no default, initially black!50!white)
Sets the background \langle color \rangle of the title area of the box.

\begin{tcolorbox}[colbacktitle=red!50!white, title=My title, coltitle=black, fonttitle=bfseries]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[colupper=red!75!black]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

This is a \textbf{tcolorbox}.
This is the lower part.

\begin{tcolorbox}[collower=red!75!black]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

This is a \textbf{tcolorbox}.
This is the lower part.

\begin{tcolorbox}[coltext=red!75!black]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

This is a \textbf{tcolorbox}.
This is the lower part.

\begin{tcolorbox}[coltitle=red!75!black, colbacktitle=black!10!white,title=Test]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

Test
This is a \textbf{tcolorbox}.
/tcb/fontupper=(text)  (no default, initially empty)
Sets \langle text \rangle before the content of the upper part (e.g. font settings).

\begin{tcolorbox}[fontupper=Hello! \textbf{\sffamily}]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

Hello! This is a \textbf{tcolorbox}.

/tcb/fontlower=(text)  (no default, initially empty)
Sets \langle text \rangle before the content of the lower part (e.g. font settings).

\begin{tcolorbox}[fontlower=\sffamily\bfseries]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

This is a \textbf{tcolorbox}.

This is the lower part.

/tcb/fonttitle=(text)  (no default, initially empty)
Sets \langle text \rangle before the content of the title text (e.g. font settings).

\begin{tcolorbox}[fonttitle=\sffamily\bfseries\large,title=Hello]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

Hello

This is a \textbf{tcolorbox}.

More color options are provided by using skins documented in Section 9 from page 117.
4.6 Geometry

`/tcb/width=⟨length⟩`  
(no default, initially \linewidth) 
Sets the total width of the colored box to ⟨length⟩. See also `/tcb/height` \textsuperscript{P.45}.

\begin{tcolorbox}[width=\linewidth/2]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[width=\linewidth/2]
\textbf{This is a tcolorbox.}
\end{tcolorbox}

\tcbset{colback=red!5!white,colframe=red!75!black}
\begin{tcolorbox}[width=\linewidth/2]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\tcbset{colback=red!5!white,colframe=red!75!black}
\begin{tcolorbox}[width=\linewidth/2]
\textbf{This is a tcolorbox.}
\end{tcolorbox}

\begin{tcolorbox}
This is a \textbf{tcolorbox}.
\end{tcolorbox}

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\begin{tcolorbox}
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}
This is a \textbf{tcolorbox}.
/tcb/toprule=⟨length⟩ (no default, initially 0.5mm)
Sets the line width of the top rule to ⟨length⟩.

\begin{tcolorbox}[toprule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/bottomrule=⟨length⟩ (no default, initially 0.5mm)
Sets the line width of the bottom rule to ⟨length⟩.

\begin{tcolorbox}[bottomrule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/leftrule=⟨length⟩ (no default, initially 0.5mm)
Sets the line width of the left rule to ⟨length⟩.

\begin{tcolorbox}[leftrule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/rightrule=⟨length⟩ (no default, initially 0.5mm)
Sets the line width of the right rule to ⟨length⟩.

\begin{tcolorbox}[rightrule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\verb|/tcb/titlerule=(length)| \hspace{1cm} (no default, initially 0.5mm)

Sets the line width of the rule below the title to \textit{(length)}.

\begin{Verbatim}
\verb|\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,|
\verb|colbacktitle=red!90!black}|
\begin{tcolorbox}[titlerule=3mm,title=This is the title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\end{Verbatim}

More options for drawing a \verb|/tcb/borderline| \textsuperscript{P.143} are provided by using skins documented in Section 9 from page 117.

\verb|/tcb/boxrule=(length)| \hspace{1cm} (style, no default, initially 0.5mm)

Sets all rules of the frame to \textit{(length)}, i.e. \verb|/tcb/toprule| \textsuperscript{P.29}, \verb|/tcb/bottomrule| \textsuperscript{P.29}, \verb|/tcb/leftrule| \textsuperscript{P.29}, \verb|/tcb/rightrule| \textsuperscript{P.29}, and \verb|/tcb/titlerule|.

\begin{Verbatim}
\verb|\tcbset{colback=red!5!white,colframe=red!75!black}|
\begin{tcolorbox}[boxrule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\end{Verbatim}
/tcb/arc=⟨length⟩ (no default, initially 1mm)
Sets the inner radius of the four frame arcs to ⟨length⟩.

\tcbset{colback=red!5!white,colframe=red!75!black}
\begin{tcolorbox}[arc=0mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[arc=4mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/outer arc=⟨length⟩ (no default, initially unset)
Sets the outer radius of the four frame arcs to ⟨length⟩.

\tcbset{colback=red!5!white,colframe=red!75!black}
\begin{tcolorbox}[arc=4mm,outer arc=1mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/auto outer arc (no value, initially set)
Sets the outer radius of the four frame arcs automatically in dependency of the inner radius
given by /tcb/arc.

/tcb/boxsep=⟨length⟩ (no default, initially 1mm)
Sets a common padding of ⟨length⟩ between the text content and the frame of the box. This
value is added to the key values of left, right, top, bottom, and middle at the appropriate
places.

\tcbset{colback=red!5!white,colframe=red!75!black,width=(\linewidth-4mm)/2,
before=,after=\hfill}
\begin{tcolorbox}[boxsep=5mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[boxsep=5mm,draft]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
/tcb/left=(length)  
Sets the left space between all text parts and frame (additional to boxsep). This is an abbreviation for setting lefttitle, leftupper, and leftlower to the same value.

\begin{tcolorbox}[left=0mm]  
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/lefttitle=(length)  
Sets the left space between title text and frame (additional to boxsep).

\begin{tcolorbox}[lefttitle=3cm,title=My Title]  
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/leftupper=(length)  
Sets the left space between upper text and frame (additional to boxsep).

\begin{tcolorbox}[leftupper=3cm,title=My Title]  
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/leftlower=(length)  
Sets the left space between lower text and frame (additional to boxsep).

\begin{tcolorbox}[leftlower=3cm]  
This is a \textbf{tcolorbox}.
\tcblower  
This is the lower part.
\end{tcolorbox}
/tcb/right\(=(\text{length})\)  
(style, no default, initially 4mm)  
Sets the right space between all text parts and frame (additional to \texttt{boxsep}). This is an abbreviation for setting \texttt{righttitle}, \texttt{rightupper}, and \texttt{rightlower} to the same value.

\begin{tcolorbox}[width=5cm,right=2cm]  
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}  
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/righttitle\(=(\text{length})\)  
(no default, initially 4mm)  
Sets the right space between title text and frame (additional to \texttt{boxsep}).

\begin{tcolorbox}[width=5cm,righttitle=2cm,title=My very long title text]  
This is a \textbf{tcolorbox} with standard upper box dimensions.
\end{tcolorbox}

\begin{tcolorbox}  
My very long title text  
This is a \textbf{tcolorbox} with standard upper box dimensions.
\end{tcolorbox}

/tcb/rightupper\(=(\text{length})\)  
(no default, initially 4mm)  
Sets the right space between upper text and frame (additional to \texttt{boxsep}).

\begin{tcolorbox}[width=5cm,rightupper=2cm,title=My very long title text]  
This is a \textbf{tcolorbox} with compressed upper box dimensions.
\end{tcolorbox}

\begin{tcolorbox}  
My very long title text  
This is a \textbf{tcolorbox} with compressed upper box dimensions.
\end{tcolorbox}
/tcb/rightlower=⟨length⟩  
(no default, initially 4mm)  
Sets the right space between lower text and frame (additional to boxsep).

\tcblower
This is the lower part with large space at right.
\end{tcolorbox}

This is a \textbf{tcolorbox} with standard upper box dimensions.
This is the lower part with large space at right.

/tcb/top=⟨length⟩  
(no default, initially 2mm)  
Sets the top space between text and frame (additional to boxsep).

\tcblower
This is the lower part.
\end{tcolorbox}

This is a \textbf{tcolorbox}.
This is the lower part.

/tcb/toptitle=⟨length⟩  
(no default, initially 0mm)  
Sets the top space between title and frame (additional to boxsep).

\begin{tcolorbox}[toptitle=3mm,title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

My title

This is a \textbf{tcolorbox}.
/tcb/bottom=(length) (no default, initially 2mm)
Sets the bottom space between text and frame (additional to boxsep).

\begin{tcolorbox}[bottom=0mm]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

This is a tcolorbox.

/tcb/bottomtitle=(length) (no default, initially 0mm)
Sets the bottom space between title and frame (additional to boxsep).

\begin{tcolorbox}[bottomtitle=3mm,title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

My title
This is a tcolorbox.

/tcb/middle=(length) (no default, initially 2mm)
Sets the space between upper and lower text to the separation line (additional to boxsep).

\begin{tcolorbox}[middle=0mm,boxsep=0mm]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

This is a tcolorbox.

This is the lower part.
/tcb/size=(name) (no default, initially normal)
Sets all geometry keys with exception of /tcb/width \textsuperscript{P.28} to predefined length values. For (name), the following values are feasible:

- **normal**: normal sized boxes e.g. of width \textwidth.
- **title**: title line sized boxes.
- **small**: small boxes e.g. for keyword highlighting.
- **fbox**: identical to the standard \fbox.
- **tight**: no padding space at all.
- **minimal**: no padding space, no box rules.

\begin{verbatim}
\tcbset{colback=red!5!white,colframe=red!75!black}
\foreach \s in {minimal,tight,fbox,small,title,normal} {
  \tcbox[size=\s,on line]{\s}
}
\foreach \s in {minimal,tight,fbox,small,title,normal} {
  \tcbox[size=\s,on line,title=Test]{\s}
}
\foreach \s in {minimal,tight,fbox,small,title,normal} {
  \begin{tcolorbox}[size=\s,on line,title=Test,width=2.2cm]
    \s \tcblower lower\end{tcolorbox}
}
\end{verbatim}

Predefined values

<table>
<thead>
<tr>
<th></th>
<th>normal</th>
<th>title</th>
<th>small</th>
<th>fbox</th>
<th>tight</th>
<th>minimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>boxrule</td>
<td>0.5mm</td>
<td>0.4mm</td>
<td>0.3mm</td>
<td>0.4pt</td>
<td>0.4pt</td>
<td>0.0pt</td>
</tr>
<tr>
<td>boxsep</td>
<td>1.0mm</td>
<td>1.0mm</td>
<td>1.0mm</td>
<td>3.0pt</td>
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<td>0.0pt</td>
</tr>
<tr>
<td>left</td>
<td>4.0mm</td>
<td>2.0mm</td>
<td>1.0mm</td>
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</tr>
<tr>
<td>right</td>
<td>4.0mm</td>
<td>2.0mm</td>
<td>1.0mm</td>
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<td>2.0mm</td>
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<td>0.0mm</td>
<td>0.0pt</td>
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<tr>
<td>bottom</td>
<td>2.0mm</td>
<td>0.25mm</td>
<td>0.0mm</td>
<td>0.0pt</td>
<td>0.0pt</td>
<td>0.0pt</td>
</tr>
<tr>
<td>toptitle</td>
<td>0.0mm</td>
<td>0.0mm</td>
<td>0.0mm</td>
<td>0.0pt</td>
<td>0.0pt</td>
<td>0.0pt</td>
</tr>
<tr>
<td>bottomtitle</td>
<td>0.0mm</td>
<td>0.0mm</td>
<td>0.0mm</td>
<td>0.0pt</td>
<td>0.0pt</td>
<td>0.0pt</td>
</tr>
<tr>
<td>middle</td>
<td>2.0mm</td>
<td>0.75mm</td>
<td>0.5mm</td>
<td>1.0pt</td>
<td>0.2pt</td>
<td>0.0pt</td>
</tr>
<tr>
<td>arc</td>
<td>1.0mm</td>
<td>0.75mm</td>
<td>0.5mm</td>
<td>1.0pt</td>
<td>0.0pt</td>
<td>0.0pt</td>
</tr>
<tr>
<td>outer arc</td>
<td>auto</td>
<td>auto</td>
<td>auto</td>
<td>auto</td>
<td>0.0pt</td>
<td>0.0pt</td>
</tr>
</tbody>
</table>
/tcb/oversize=⟨length⟩ (style, default 0pt)

Sets the text width of the upper part to the current line width plus an optional ⟨length⟩. This is achieved by changing the keys /tcb/width \textsuperscript{P.28} /tcb/enlarge left by \textsuperscript{P.77}, and /tcb/enlarge right by \textsuperscript{P.77} appropriately. The resulting box is overlapping into the left and right margin of the page. Note that this style option has to be given after all other geometry keys!

\begin{tcolorbox}[oversize,title=Oversized box]
\lipsum[2]
\end{tcolorbox}

\begin{tcolorbox}[title=Normal box]
\lipsum[2]
\end{tcolorbox}

Normal text for comparison:

Oversized box

Normal box
According to the \{toggle preset\}, the left and the right settings of the \texttt{tcolorbox} are switched or not. Feasible values are:

- \texttt{none}: no switching.
- \texttt{forced}: the values of the left and right rules and spaces are switched.
- \texttt{evenpage}: if the page is an even page, the values of the left and right rules and spaces are switched. It is recommended that one use this setting in conjunction with \texttt{/tcb/check odd page}.

% \usepackage{changepage} for 'check odd page'
% \usepackage{lipsum}
% \usetikzlibrary{patterns}
% \tcbuselibrary{skins,breakable}
\begin{tcolorbox}[skin=enhancedmiddle,breakable,
check odd page,toggle left and right,
boxrule=0mm,top=0mm,bottom=0mm,left=1mm,right=1mm,
rightrule=1cm,colupper=blue!25!black,
interior style={fill overzoom image=lichtspiel.jpg,fill image opacity=0.25},
frame style={pattern=crosshatch dots light steel blue},
overlay={
% \ifoddpage\coordinate (X) at ([xshift=-5mm]frame.east);\n% \else\coordinate (X) at ([xshift=5mm]frame.west);\n% fi\n\fill[shading=ball,ball color=blue!50!white,opacity=0.5] (X) circle (4mm);\n}]
\lipsum[1-6]
\end{tcolorbox}

This example switches a 1cm thick rule from the left to the right side depending on the page number. Thereby, the rule is always on the outer side of the double-sided paper. Additionally, a ball is drawn on the outer side with help of an overlay.


4.7 Corners

The four corners of any \texttt{tcolorbox} can be set individually as \texttt{/tcb/sharp corners} or as \texttt{/tcb/rounded corners}. These settings are also reflected in the behavior of \texttt{/tcb/borderline} and \texttt{/tcb/shadow} as one would expect.

By default, all four corners are \textit{rounded}. So, only the \texttt{/tcb/sharp corners} option will be necessary for most use cases. The \texttt{/tcb/rounded corners} option can be used to revert a \texttt{/tcb/sharp corners} setting.

\texttt{/tcb/sharp corners=\{position\}} \hspace{1cm} (default \texttt{all}, initially unset)

The \texttt{\{position\}} denotes one or more of the four box corners to be set as \textit{sharp corners}. The not assigned corners will retain their mode. Feasible values for \texttt{\{position\}} are:

- \texttt{northwest}
- \texttt{northeast}
- \texttt{southwest}
- \texttt{southeast}
- \texttt{north}
- \texttt{south}
- \texttt{east}
- \texttt{west}
- \texttt{downhill}
- \texttt{uphill}
- \texttt{all}

\begin{tcolorbox}[colback=red!5!white, colframe=red!75!black, sharp corners=northwest ]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[colback=red!5!white, colframe=red!75!black, sharp corners ]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
The /tcb/rounded corners\hspace*{1em}can be used to revert a /tcb/sharp corners\hspace*{1em}setting. The \langle position \rangle\hspace*{1em}denotes one or more of the four box corners to be set as rounded corners. The not assigned corners will retain their mode. Feasible values for \langle position \rangle\hspace*{1em}are\hspace*{1em}2:

- \textbf{northwest}
- \textbf{northeast}
- \textbf{southwest}
- \textbf{southeast}
- \textbf{north}
- \textbf{south}
- \textbf{east}
- \textbf{west}
- \textbf{downhill}
- \textbf{uphill}
- \textbf{all}

\begin{tcolorbox}[colback=red!5!white, colframe=red!75!black,sharp corners, rounded corners=northwest ]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[colback=red!10!white, colframe=red!75!black,sharpish corners]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\textbf{/tcb/sharpish corners} \hspace*{1em} (style, no value)

Shortcut for setting /tcb/arc\hspace*{1em}and /tcb/outer arc\hspace*{1em}to 0pt. With this setting, rounded corners will appear as quasi-sharp, but e.g. the shadow will be somewhat rounder than the shadow of really sharp corners.

Corners are still of type rounded with this option, but appear sharp. To switch back to rounded corners, one has to adapt /tcb/arc\hspace*{1em}and /tcb/outer arc\hspace*{1em}.

\begin{tcolorbox}[colback=red!5!white, colframe=red!75!black,sharp corners ]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[colback=red!10!white, colframe=red!75!black,sharpish corners]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\footnote{The graphical examples assume that the boxes where set to have sharp corners before.}
The following examples will show the differences between \texttt{tcb/rounded corners}\textsuperscript{P. 41}, \texttt{tcb/sharpish corners}\textsuperscript{P. 41}, and \texttt{tcb/sharp corners}\textsuperscript{P. 40}. The later two give the same core box, but \texttt{tcb/borderline}\textsuperscript{P. 143} and \texttt{tcb/shadow}\textsuperscript{P. 148} settings are slightly different. The following examples use \texttt{tcb/drop fuzzy shadow}\textsuperscript{P. 150}. 

---

**My title**

This is a \texttt{tcolorbox}.

**rounded corners**

---

**My title**

This is a \texttt{tcolorbox}.

**sharpish corners**

---

**My title**

This is a \texttt{tcolorbox}.

**sharp corners**
4.8 Transparency

Transparency effects are likely to be used in conjunction with jigsaw skin variants, see Section 9.10 on page 164.

\( /\text{tcb/opacityframe}=\langle \text{fraction} \rangle \)  
(no default, initially 1.0) 
Sets the frame opacity of the box to the given \( \langle \text{fraction} \rangle \).

\begin{tcolorbox}[opacityframe=0.25] 
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\( /\text{tcb/opacityback}=\langle \text{fraction} \rangle \)  
(no default, initially 1.0) 
Sets the background opacity of the box to the given \( \langle \text{fraction} \rangle \).

\begin{tcolorbox}[standard jigsaw, opacityframe=0.5, opacityback=0.5] 
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\( /\text{tcb/opacitybacktitle}=\langle \text{fraction} \rangle \)  
(no default, initially 1.0) 
Sets the title background opacity of the box to the given \( \langle \text{fraction} \rangle \).

\begin{tcolorbox}[standard jigsaw, opacityframe=0.5, opacitybacktitle=0.5, title filled, title=This is a title] 
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\( /\text{tcb/opacityfill}=\langle \text{fraction} \rangle \)  
(style, no default, initially 1.0) 
Sets the fill opacity for frame, interior and optionally the title background to the given \( \langle \text{fraction} \rangle \).

\begin{tcolorbox}[standard jigsaw, opacityfill=0.7, title=This is a title] 
This is a \textbf{tcolorbox}.
\end{tcolorbox}
/tcb/opacityupper=⟨fraction⟩ (no default, initially 1.0)
Sets the text opacity of the upper box part to the given ⟨fraction⟩.

\begin{tcolorbox}[enhanced,opacityupper=0.5, interior style={pattern=crosshatch dots light steel blue}]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/opacitylower=⟨fraction⟩ (no default, initially 1.0)
Sets the text opacity of the lower box part to the given ⟨fraction⟩.

\begin{tcolorbox}[enhanced,opacitylower=0.5, interior style={pattern=crosshatch dots light steel blue}]
\tcblower
This is the lower part.
\end{tcolorbox}

/tcb/opacitytext=⟨fraction⟩ (no default, initially 1.0)
Sets the text opacity of the upper and the lower box part to the given ⟨fraction⟩.

\begin{tcolorbox}[enhanced,opacitytext=0.5, interior style={pattern=crosshatch dots light steel blue}]
\tcblower
This is the lower part.
\end{tcolorbox}

/tcb/opacitytitle=⟨fraction⟩ (no default, initially 1.0)
Sets the text opacity of the box title to the given ⟨fraction⟩.

\begin{tcolorbox}[enhanced,opacitytitle=0.7, fonttitle=\bfseries, title=This is a title, title style={pattern=crosshatch dots light steel blue}]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[enhanced jigsaw, fonttitle=\bfseries, title=This is a title, opacityframe=0.5, opacityback=0.25, opacitybacktitle=0.25, opacitytext=0.8, colback=red!5!white, colframe=red!75!black, colbacktitle=yellow!20!red]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
4.9 Height Control

In a typical usage scenario, the height of a \texttt{tcolorbox} is computed automatically to fit the content. Nevertheless, the height can be set to a fixed value or to fit commonly for several boxes, e.g. if boxes are set side by side.

The height control keys are only applicable to unbreakable boxes. If a box is set to be \texttt{/tcb/breakable}, the height is always computed according to the \texttt{natural height}.

\texttt{/tcb/natural height} \hspace{1cm} (no value, initially set)
Sets the total height of the colored box to its natural height depending on the box content.

\texttt{/tcb/height=\langle length\rangle} \hspace{1cm} (no default)
Sets the total height of the colored box to \langle length\rangle independent of the box content. \langle length\rangle is the minimum height of the box, if \texttt{/tcb/height plus} is larger than zero.

\texttt{/tcb/height plus=\langle length\rangle} \hspace{1cm} (no default, initially 0pt)
The box may extend a given fixed \texttt{/tcb/height} up to the given \langle length\rangle.

This box has a height of 1cm.
This box has a height of 2cm.
This box has a height of 3cm.
Lower part.

This box has a height of 1cm.
This box has a height of 1cm. This is a tcolorbox.
This box has a height of 1cm. This is a tcolorbox. This is a tcolorbox.
/tcb/height from=(min) to ⟨max⟩ (style, no default)
Sets the box height to a dimension between ⟨min⟩ and ⟨max⟩.

% \usepackage{lipsum}
\newtcolorbox{mybox}{colback=red!5!white,colframe=red!75!black,left=1mm,top=1mm, bottom=1mm,right=1mm,boxsep=0mm,width=4.5cm,nobeforeafter, height from=2cm to 8cm}
\begin{mybox}
This is a tcolorbox.
\end{mybox}
\begin{mybox}
This is a tcolorbox. This is a tcolorbox. This is a tcolorbox.
\end{mybox}
\begin{mybox}
\lipsum[2]
\end{mybox}
This is a tcolorbox.
This is a tcolorbox.
This is a tcolorbox.
This is a tcolorbox.
This is a tcolorbox.

\begin{tcolorbox}
\textbf{tcolorbox} where the text area has a height of 2cm.
\end{tcolorbox}
This is a \textbf{tcolorbox} where the text area has a height of 2cm.

/tcb/text height=(length) (style, no default)
Sets the text height to ⟨length⟩. This is the length from the top of the upper part to the bottom of the optional lower part. See also /tcb/text width \textsuperscript{P.28}.

\begin{tcolorbox}[text height=2cm]
This is a \textbf{tcolorbox} where the text area has a height of 2cm.
\end{tcolorbox}
This is a \textbf{tcolorbox} where the text area has a height of 2cm.
/tcb/add to height=(length)  
(style, no default)

Adds (length) to the current height of the colored box. /tcb/height\textsuperscript{P.45} has to be set before this key is used!

\begin{tcolorbox}
\begin{tcblockoption}{height=1cm, valign=center, before=, after=\hfill, colframe=blue!75!black, colback=white}
\begin{tcolorbox}
This box has a height of 1cm.
\end{tcolorbox}
\begin{tcolorbox}[add to height=1cm]
This box has a height of 2cm.
\end{tcolorbox}
\end{tcolorbox}

/tcb/height fill=true|false|maximum  
(default true, initially false)

If set to true, the height of the tcolorbox is set to the rest of the available vertical space of the current page. If set to maximum, the page is compressed as much as possible. Note that the tcolorbox is always set as its own paragraph using this option.

Note that the library \texttt{breakable} has to be loaded to use this key!

This height control key is only applicable to unbreakable boxes but it uses code from the library \texttt{breakable}. The counterpart for breakable boxes is /tcb/height fixed for\textsuperscript{P.302}.

\begin{tcolorbox}
\begin{tcbuselibrary}{breakable}
\begin{tcolorbox}[height fill, colback=red!5!white, colframe=red!75!black, fonttitle=\bfseries, title=Box which fills the rest of the page]
\lipsum[1]
\end{tcolorbox}
\end{tcbuselibrary}
\end{tcolorbox}

Box which fills the rest of the page

/tcb/space=(\textit{fraction}) \ (\textit{no default, initially 0})

If the height of a \texttt{tcolorbox} is not the natural height, the space difference between the forced and the natural size is distributed between the upper and the lower part of the box. This space could also be negative. \textit{(fraction)} with a value between 0 and 1 is the amount of space which is added to the upper part, the rest is added to the lower part. If there is no lower part, then all of the space is added to the upper part always.

\begin{tcolorbox}[width=(\linewidth-2mm)/3,before=,after=\texttt{hfill},
colframe=blue!75!black,colback=white,height=3cm]
\foreach \f in {0.2,0.4,0.7}
{\begin{tcolorbox}[space=\f]
  This is the upper part.
  \tcblower
  This is the lower part.
\end{tcolorbox}}
\end{tcolorbox}

\begin{tcolorbox}[width=(\linewidth-2mm)/3,before=,after=\texttt{hfill},
colframe=blue!75!black,colback=white,height=3cm]
\foreach \myspace in \{space to upper,space to both,space to lower\}
{\begin{tcolorbox}[\myspace]
  This is the upper part.
  \tcblower
  This is the lower part.
\end{tcolorbox}}
\end{tcolorbox}

\textbf{/tcb/space to upper} \ (\textit{style})

This is an abbreviation for \texttt{space=1}, i.e. all extra space is added to the upper part.

\textbf{/tcb/space to lower} \ (\textit{style, initially set})

This is an abbreviation for \texttt{space=0}, i.e. all extra space is added to the lower part (if there is any).

\textbf{/tcb/space to both} \ (\textit{style})

This is an abbreviation for \texttt{space=0.5}, i.e. the extra space equally distributed between the upper and the lower part.
If the height of a `tcolorbox` is not the natural height, the \textit{split} with a value between 0 and 1 determines the positioning of the segmentation between the upper and the lower part. Here, 0 stands for top and 1 for bottom. Note that the box is split regardless of the actual dimensions of the text parts!

\begin{tcolorbox}[split=0.1]
This is the upper part.
\tcblower
This is the lower part with a lot of text in several lines.
\end{tcolorbox}

\begin{tcolorbox}[split=0.5]
This is the upper part.
\tcblower
This is the lower part with a lot of text in several lines.
\end{tcolorbox}

\begin{tcolorbox}[split=0.8]
This is the upper part.
\tcblower
This is the lower part with a lot of text in several lines.
\end{tcolorbox}

\textit{valign} determines the vertical \textit{alignment} of the upper part. Feasible values are \texttt{top}, \texttt{center}, and \texttt{bottom}. For a box with natural height, these values are meaningless.

\begin{tcolorbox}[valign=top]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[valign=center]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[valign=bottom]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

This key has the same meaning for the lower part as \texttt{valign} for the upper part, i.e. it determines the vertical \texttt{alignment} of the lower part with feasible values \texttt{top}, \texttt{center}, and \texttt{bottom}.
Boxes which are members of an equal height group will all get the same height, i.e. the maximum of all their natural heights. The $\langle id \rangle$ serves to distinguish between different height groups. Note that you have to compile twice to see changes and that height groups are global definitions.

\begin{tcolorbox}[equal height group=A,adjusted title={One}]
My smallest box.
\end{tcolorbox}

\begin{tcolorbox}[equal height group=A,adjusted title={Two}]
This box is also small.
\end{tcolorbox}

\begin{tcolorbox}[equal height group=A,adjusted title={Three}]
This box contains a lot of text just to fill the space with word flowing and flowing and flowing until the box is filled with all of it.
\end{tcolorbox}

\begin{tcolorbox}[equal height group=B]
Now, we use another equal height group.
\end{tcolorbox}

\begin{tcolorbox}[equal height group=B]
\begin{equation*}
\int_{0}^{1} x^2 = \frac{1}{3}.
\end{equation*}
\end{tcolorbox}

See Section 12 on page 222 for more equal height options.
Plants a \langle length \rangle into the equal height group with the given \langle id \rangle. This ensures that the height will not drop below \langle length \rangle. Note that you cannot reduce a computed height value by using this key with a small value. The difference to applying /tcb/height \textsuperscript{P.45} directly is that the boxes are never too small for their content.

\begin{tcolorbox}
My first box. All boxes will get 3.5cm times 3.5cm if the content height is not too large.
\end{tcolorbox}

\begin{tcolorbox}
My second box.
\end{tcolorbox}

\begin{tcolorbox}
This is the lower part.
\end{tcolorbox}

\begin{tcblisting}{\textbf{Mixed}}
\end{tcblisting}

\begin{tcolorbox}[title={Fourth box}]
My final box.
\end{tcolorbox}
4.10 Box Content Additions

The following options introduce some arbitrary \textit{code} to the content of a \texttt{tcolorbox}. These additions can be given at the beginning or at the ending of the title, the upper part, or the lower part.

\texttt{/tcb/before title=\textit{code}} \hspace{1cm} (no default, initially unset)

The given \textit{code} is placed \textit{after} the color and font settings and \textit{before} the content of the title.

\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\end{tcolorbox}

\begin{Verbatim}
\tcsb{before title ={\textcolor{yellow}{\large Important}:--}},
colback=red!5!white,colframe=red!75!black,fonttitle=\textbf{series}
\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\end{tcolorbox}
\end{Verbatim}

\texttt{/tcb/after title=\textit{code}} \hspace{1cm} (no default, initially unset)

The given \textit{code} is placed \textit{after} the content of the title.

\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\end{tcolorbox}

\begin{Verbatim}
\tcsb{after title ={\textcolor{Navy}{\textbf{approved}}}},
colback=red!5!white,colframe=red!75!black,fonttitle=\textbf{series}
\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\end{tcolorbox}
\end{Verbatim}

\texttt{/tcb/before upper=\textit{code}} \hspace{1cm} (no default, initially unset)

The given \textit{code} is placed \textit{after} the color and font settings and \textit{before} the content of the upper part.

\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\end{tcolorbox}

\begin{Verbatim}
\tcsb{before upper ={\textit{The story:}\par}},
colback=red!5!white,colframe=red!75!black,fonttitle=\textbf{series}
\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\end{tcolorbox}
\end{Verbatim}
The given \( \text{code} \) is placed \textit{after} the content of the upper part.

The given \( \text{code} \) is placed \textit{after} the color and font settings and \textit{before} the content of the lower part.

The given \( \text{code} \) is placed \textit{after} the content of the lower part.
This style sets /tcb/before title \(\text{P.\hspace{1em}52}\) to \texttt{centering}.

\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\end{tcolorbox}

\begin{framed}
\texttt{My title}
\begin{center}
This is a \texttt{tcolorbox}.
\end{center}
\end{framed}

This style sets /tcb/before upper \(\text{P.\hspace{1em}52}\) to \texttt{centering}.

\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\end{tcolorbox}

\begin{framed}
\texttt{My title}
\begin{center}
This is a \texttt{tcolorbox}.
\end{center}
\end{framed}

This style sets /tcb/before lower \(\text{P.\hspace{1em}53}\) to \texttt{centering}.

\begin{tcolorbox}[title=My title]
This is a \texttt{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

\begin{framed}
\texttt{My title}
\begin{center}
This is a \texttt{tcolorbox}.
\end{center}
\begin{center}
This is the lower part.
\end{center}
\end{framed}
/tcb/flushleft title
This style sets /tcb(before title) \textit{\textsuperscript{P.52}} to \texttt{raggedright}.

\begin{tcolorbox}[title=My title which is quite long but always flushed left]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

My title which is quite long but always flushed left
This is a \textbf{tcolorbox}.

/tcb/flushleft upper
This style sets /tcb(before upper) \textit{\textsuperscript{P.52}} to \texttt{raggedright}.

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}. Here, the content is flushed left. You see the effect on the right hand side.
\end{tcolorbox}

My title
This is a \textbf{tcolorbox}. Here, the content is flushed left. You see the effect on the right hand side.

/tcb/flushleft lower
This style sets /tcb(before lower) \textit{\textsuperscript{P.53}} to \texttt{raggedright}.

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}. The upper part is not flushed left or right. This could be unpleasant for small boxes.
\tcblower
This is the lower part. Here, the content is flushed left. You see the effect on the right hand side.
\end{tcolorbox}

My title
This is a \textbf{tcolorbox}. The upper part is not flushed left or right. This could be unpleasant for small boxes.

\tcblower
This is the lower part. Here, the content is flushed left. You see the effect on the right hand side.
/tcb/flushright title  (style, no value, initially unset)
This style sets /tcb/before title \p.52 to \raggedleft.

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/flushright upper  (style, no value, initially unset)
This style sets /tcb/before upper \p.52 to \raggedleft.

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/tcb/flushright lower  (style, no value, initially unset)
This style sets /tcb/before lower \p.53 to \raggedleft.

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\tclower
This is the lower part.
\end{tcolorbox}
If `/tcb/tabularx` or `/tcb/tabularx*` are used, one cannot have a lower part.

### `/tcb/tabularx=(preamble)`

This style sets `/tcb/before upper` \(^{\text{P.52}}\) and `/tcb/after upper` \(^{\text{P.53}}\) and several geometry keys to support a `tabularx` with the given *(preamble)*. The packages `tabularx` \(^{[4]}\), `array`, and `colortbl` have to be loaded separately.

```latex
\usepackage{array,tabularx}
\usepackage{colortbl} \text{- or -} \usepackage[\table]{xcolor}
\newcolumntype{Y}{>{\raggedleft\arraybackslash}X}
\tcbset{enhanced,fonttitle=\bfseries\large,fontupper=\normalsize\sffamily, colback=yellow!10!white,colframe=red!50!black,colbacktitle=Salmon!30!white, coltitle=black,center title}
\begin{tcolorbox}[tabularx={X||Y|Y|Y|Y||Y},title=My table]
\hline
\text{Group} & \text{One} & \text{Two} & \text{Three} & \text{Four} & \text{Sum} \\
\hline
\text{Red} & 1000.00 & 2000.00 & 3000.00 & 4000.00 & 10000.00 \\
\hline
\text{Green} & 2000.00 & 3000.00 & 4000.00 & 5000.00 & 14000.00 \\
\hline
\text{Blue} & 3000.00 & 4000.00 & 5000.00 & 6000.00 & 18000.00 \\
\hline
\text{Sum} & 6000.00 & 9000.00 & 12000.00 & 15000.00 & 42000.00 \\
\end{tcolorbox}
```

### `/tcb/tabularx*={⟨code⟩}{⟨preamble⟩}`

This is a variant of `/tcb/tabularx` which adds some *(code)* before the table starts.

```latex
\begin{tcolorbox}[tabularx={X||Y|Y|Y|Y||Y},title=My table]
\hline
\text{Group} & \text{One} & \text{Two} & \text{Three} & \text{Four} & \text{Sum} \\
\hline
\text{Red} & 1000.00 & 2000.00 & 3000.00 & 4000.00 & 10000.00 \\
\hline
\text{Green} & 2000.00 & 3000.00 & 4000.00 & 5000.00 & 14000.00 \\
\hline
\text{Blue} & 3000.00 & 4000.00 & 5000.00 & 6000.00 & 18000.00 \\
\hline
\text{Sum} & 6000.00 & 9000.00 & 12000.00 & 15000.00 & 42000.00 \\
\end{tcolorbox}
```
/tcb/tikz upper=(options) (style)
This style adds a centered \texttt{tikzpicture} environment to the start and end of the upper part. The \langle options \rangle may be given as TikZ picture options.

\% \usepackage{tikz}
\begin{tcolorbox}[tikz upper,fonttitle=\textbf{\bfseries},colback=white,colframe=black, title=\tikzname\ drawing]
\path[fill=yellow,draw=yellow!75!red] (0,0) circle (1cm);
\fill[red] (45:5mm) circle (1mm);
\fill[red] (135:5mm) circle (1mm);
\draw[line width=1mm,red] (215:5mm) arc (215:325:5mm);
\end{tcolorbox}

/tcb/tikz lower=(options) (style)
This style adds a centered \texttt{tikzpicture} environment to the start and end of the lower part. The \langle options \rangle may be given as TikZ picture options.

\% \usepackage{tikz}
\% \tcbuselibrary{skins,listings}
\tcbset{tikz lower,listing side text,fonttitle=\textbf{\bfseries}, bicolor,colback=LightBlue!50!white,colbacklower=white,colframe=black, righthand width=3cm}
\begin{tcblisting}{title=\tikzname\ drawing}
\path[fill=yellow,draw=yellow!75!red] (0,0) circle (1cm);
\fill[red] (45:5mm) circle (1mm);
\fill[red] (135:5mm) circle (1mm);
\draw[line width=1mm,red] (215:5mm) arc (215:325:5mm);
\end{tcblisting}
/tcb/tikznode upper\texttt{\{options\}} (style)

This style places the upper part content into a centered Ti\textit{k}Z node. The \texttt{\{}options\texttt{\}} may be given as Ti\textit{k}Z node options. This style is especially useful for boxes with multiline texts which are fitted to the text width.

% \usepackage{tikz}
\newtcbbox{\headline}{[1][1]{enhanced,before=\begin{center},after=\end{center},
  fontupper=\textsc{Large}\textbf{series},colframe=red!50!black,colback=red!10!white,
  drop fuzzy shadow=yellow,tikznode upper,#1}}
\headline{Important\textbackslash Headline}

Important Headline

/tcb/tikznode lower\texttt{\{options\}} (style)

This style places the lower part content into a centered Ti\textit{k}Z node. The \texttt{\{}options\texttt{\}} may be given as Ti\textit{k}Z node options.

% \usepackage{tikz}
\begin{tcolorbox}[bicolor,colback=LightBlue!50!white,colbacklower=white,
  colframe=black,tikznode lower={inner sep=2pt,draw=red,fill=yellow}]
Upper part.
\tcblower
Lower part.
\end{tcolorbox}

/tcb/tikznode\texttt{\{options\}} (style)

Shortcut for setting /tcb/tikznode upper and /tcb/tikznode lower the same time.

/tcb/varwidth upper\texttt{\{length\}} (style, default /tcb/width P.28)

This style places the upper part content into a \texttt{varwidth} environment. This style needs the \texttt{varwidth} package [1] to be loaded manually. The resulting box has a maximal width of \texttt{\{}length\texttt{\}}. This option is only senseful for a \texttt{tcbox} P.13.

% \usepackage{varwidth}
\newtcbbox{\varbox}{colframe=red!50!black,
  colback=red!10!white,varwidth upper}
\varbox{Short text.}
\varbox{This box contains is a longer text which is broken.}
The given \texttt{code} is executed immediately. This option is useful to place some arbitrary code into an option list.

\begin{tcolorbox}
\texttt{\newcommand\mycommand{\textit{working}}},
\texttt{title=My mycommand\ title}
\end{tcolorbox}

This is a \textbf{tcolorbox}.
4.11 Overlays

With an overlay, arbitrary *(graphical code)* can be added to a *tcolorbox*. This code is executed *after* the frame and interior are drawn and *before* the text content is drawn. Therefore, you can decorate the *tcolorbox* with your own extensions. Common special cases are *watermarks* which are implemented using overlays. See Subsection 9.3 from page 131 if you want to add *watermarks*.

If you use the core package only, the *(graphical code)* has to be *pgf* code and there is not much assistance for positioning. Therefore, the usage of the /tcb/enhanced *P.169* mode from the library skins is recommended which allows *tikz* code and gives access to /tcb/geometry nodes *P.108* for positioning.

/tcb/overlay=(graphical code)  
(no default, initially unset)
Adds *(graphical code)* to the box drawing process. This *(graphical code)* is drawn *after* the frame and interior and *before* the text content.

```latex
% \tcbselibrary{skins} \preamble
\tcbset{frogbox/.style={enhanced,colback=green!10,colframe=green!65!black, 
    enlarge top by=5.5mm, 
    overlay={\foreach \x in {2cm,3.5cm} { 
    \begin{scope}[shift={([xshift=\x]frame.north west)}] 
    \path[draw=green!65!black,fill=green!10,line width=1mm] (0,0) arc (0:180:5mm); 
    \path[fill=black] (-0.2,0) arc (0:180:1mm); 
    \end{scope}}}}} 

\begin{tcolorbox}[frogbox,title=My title] 
This is a *tcolorbox*. 
\end{tcolorbox} 

My title
This is a *tcolorbox*.

% \usetikzlibrary{patterns} \preamble 
% \tcbselibrary{skins} \preamble 
\tcbset{ribbonbox/.style={enhanced,colback=red!5!white,colframe=red!75!black, 
    fonttitle=bfseries, 
    overlay={\path[fill=blue!75!white,draw=blue,double=white!85!blue, 
        preaction={opacity=0.6,fill=blue!75!white}, 
        line width=0.1mm,double distance=0.2mm, 
        pattern=fivepointed stars,pattern color=white!75!blue] 
    ([xshift=-0.2mm,yshift=-1.02cm]frame.north east) 
    -- ++(-1,1) -- ++(-0.5,0) -- ++(1.5,-1.5) -- cycle;}}} 
\begin{tcolorbox}[ribbonbox,title=My title] 
This is a *tcolorbox*. 
\tcblower 
This is the lower part. 
\end{tcolorbox} 

My title
This is a *tcolorbox*.
This is the lower part.

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/tcb/no overlay (style, no default, initially set)  
Removes the overlay if set before.

/tcb/overlay broken=(graphical code) (no default, initially unset)  
If the box is set to be /tcb/breakable *P.297* and is broken actually, then the (graphical code) is added to the box drawing process. /tcb/overlay *P.61* overwrites this key.

/tcb/overlay unbroken=(graphical code) (no default, initially unset)  
If the box is set to be /tcb/unbreakable *P.298* then the (graphical code) is added to the box drawing process. /tcb/overlay *P.61* overwrites this key.

/tcb/overlay first=(graphical code) (no default, initially unset)  
If the box is set to be /tcb/breakable *P.297* and is broken actually, then the (graphical code) is added to the box drawing process for the first part of the break sequence. /tcb/overlay *P.61* overwrites this key.

/tcb/overlay middle=(graphical code) (no default, initially unset)  
If the box is set to be /tcb/breakable *P.297* and is broken actually, then the (graphical code) is added to the box drawing process for the middle parts (if any) of the break sequence. /tcb/overlay *P.61* overwrites this key.

/tcb/overlay last=(graphical code) (no default, initially unset)  
If the box is set to be /tcb/breakable *P.297* and is broken actually, then the (graphical code) is added to the box drawing process for the last part of the break sequence. /tcb/overlay *P.61* overwrites this key.

/tcb/overlay unbroken and first=(graphical code) (no default, initially unset)  
This is an optimized abbreviation for setting /tcb/overlay unbroken and /tcb/overlay first together. /tcb/overlay *P.61* overwrites this key.

/tcb/overlay middle and last=(graphical code) (no default, initially unset)  
This is an optimized abbreviation for setting /tcb/overlay middle and /tcb/overlay last together. /tcb/overlay *P.61* overwrites this key.

/tcb/overlay unbroken and last=(graphical code) (no default, initially unset)  
This is an optimized abbreviation for setting /tcb/overlay unbroken and /tcb/overlay last together. /tcb/overlay *P.61* overwrites this key.

/tcb/overlay first and middle=(graphical code) (no default, initially unset)  
This is an optimized abbreviation for setting /tcb/overlay first and /tcb/overlay middle together. /tcb/overlay *P.61* overwrites this key.

---

This example demonstrates the application of break sequence specific overlay options. Here, we define an environment myexample based on tcolorbox where the visible drawing is done totally by overlay keys. Here, the first application of myexample produces an unbroken tcolorbox. The frame is drawn by the code given with /tcb/overlay unbroken. The second application of myexample is broken into several parts which are drawn by the codes given with /tcb/overlay first, /tcb/overlay middle, and /tcb/overlay last.

% Preamble:  
%\usepackage{tikz,lipsum}  
%\tcbuselibrary{skins,breakable}  
%newcounter{example}  
\colorlet{colexam}{red!75!black}
Example 1


Example 2


4.12 Floating Objects

\texttt{/tcb/floatplacement=⟨values⟩} \hspace{1em} \text{ (no default, initially \texttt{htb})}
Sets ⟨values⟩ as default values for the usage of \texttt{/tcb/float} and \texttt{/tcb/float*}. Feasible are the usual parameters for floating objects.

\begin{tcolorbox}
\texttt{\tcbset{enhanced, colback=red!5!white, colframe=red!75!black,}
watermark color=red!15!white}}
\begin{tcolorbox}[floatplacement=t,float, title=Floating box from |floatplacement|, watermark text={I am floating}]
This floating box is placed at the top of a page.
\end{tcolorbox}
\end{tcolorbox}

\texttt{/tcb/float=⟨values⟩} \hspace{1em} \text{ (default from \texttt{floatplacement})}
Turns the box to a floating object where ⟨values⟩ are the usual parameters for such floating objects. If they are not used, the placement uses the default values given by \texttt{floatplacement}.

\begin{tcolorbox}
\begin{tcolorbox}[float, title=Floating box from |float|, enhanced, watermark text={I'm also floating}]
This box floats to a feasible place automatically. You do not have to use a numbering for this floating object.
\end{tcolorbox}
\end{tcolorbox}

\texttt{/tcb/float*=⟨values⟩} \hspace{1em} \text{ (default from \texttt{floatplacement})}
Identical to \texttt{/tcb/float}, but for wide boxes spanning the whole page width of two column documents or in conjunction with the packages \texttt{multicol} or \texttt{paracol}. Note that you have to set \texttt{width=\textwidth} additionally, if the box should span the whole page width in these cases!

\begin{tcolorbox}
\begin{tcolorbox}[float*=b, title=Floating box from |float*|, width=\textwidth, enhanced, watermark text={I'm also floating}]
In this single column document, you will see no difference to |float|.
\end{tcolorbox}
\end{tcolorbox}

\texttt{/tcb/nofloat} \hspace{1em} \text{ (style, initially set)}
Turns the floating behavior off.

\begin{tcolorbox}
\begin{tcolorbox}[float*, title=Floating box from |float*|, width=\textwidth, enhanced, watermark text={I'm also floating}]
In this single column document, you will see no difference to \texttt{float}.
\end{tcolorbox}
\end{tcolorbox}
//tcb/every float=(code)

For floating objects, the //tcb/before\textsuperscript{P.72} and //tcb/after\textsuperscript{P.72} settings are ignored. Instead, the given \texttt{(code)} is inserted before a floating box. If the box is //tcb/breakable\textsuperscript{P.297}, the given \texttt{(code)} is inserted before every part of the break sequence. The most common use case is \texttt{every float=\texttt{centering}}.

```latex
\tcbox[float=htb,title={Floating box},every float=\texttt{centering},
\colback=blue!50!black,\colframe=blue!50!white,\colbacktitle=blue!10!white,\coltitle=black,center title]
{\includegraphics[height=6cm]{lichtspiel.jpg}}
```

Floating box
4.13 Side by Side

Further side by side options for code examples are /tcb/listing side text \[\text{P.249}\], /tcb/text side listing \[\text{P.249}\], /tcb/listing outside text \[\text{P.249}\], and /tcb/text outside listing \[\text{P.249}\].

/tcb/sidebyside=true|false (default true, initially false)

Normally, the upper part and the lower part of the box have their positions as their names suggest. If sidebyside is set to true, the upper part is drawn left-handed and the lower part is drawn right-handed. Both parts are drawn together with the geometry settings of the upper part but the space is divided horizontally according to the following options. Colors, fonts, and box content additions are used individually. The resulting box is unbreakable.

\begin{tcolorbox}[title=My title,sidebyside]
This is the upper (left-handed) part. \\
tcblower
This is the lower (right-handed) part.
\end{tcolorbox}

/tcb/sidebyside align=alignment value (no default, initially center)

Sets the vertical alignment for the left-handed and right-handed part. Feasible values are center, top, and bottom.

\begin{tcolorbox}[adjusted title=center,sidebyside align=center]
This is a text which is too long for one line. \\
tcblower
This is a short text.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=top,sidebyside align=top]
This is a text which is too long for one line. \\
tcblower
This is a short text.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=bottom,sidebyside align=bottom]
This is a text which is too long for one line. \\
tcblower
This is a short text.
\end{tcolorbox}
/tcb/sidebyside gap\=(\textit{length}) \quad \text{(no default, initially 10mm)}

Sets the horizontal distance between the left-handed and right-handed part to \textit{\langle length \rangle}.

```
\tcset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,nobeforeafter,
sidebyside,width=(\linewidth-2mm)/2}

\begin{tcolorbox}[adjusted title=Wide gap,sidebyside gap=30mm]
This is a text which is too long for one line.
\tcblower
This is a short text.
\end{tcolorbox}

\begin{tcolorbox}[adjusted title=Narrow gap,sidebyside gap=1mm]
This is a text which is too long for one line.
\tcblower
This is a short text.
\end{tcolorbox}
```

/tcb/lefthand width\=(\textit{length}) \quad \text{(no default, initially unset)}

Sets the width of the left-handed part to the given \textit{\langle length \rangle}.

```
\tcset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title,sidebyside,lefthand width=3cm]
This is the upper (\textit{left-handed}) part.
\tcblower
This is the lower (\textit{right-handed}) part.
\end{tcolorbox}
```

/tcb/righthand width\=(\textit{length}) \quad \text{(no default, initially unset)}

Sets the width of the right-handed part to the given \textit{\langle length \rangle}.

```
\tcset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title,sidebyside,righthand width=3cm]
This is the upper (\textit{left-handed}) part.
\tcblower
This is the lower (\textit{right-handed}) part.
\end{tcolorbox}
```
/tcb/lefthand ratio=\langle fraction \rangle  
(no default, initially 0.5)  
Sets the width of the left-handed part to the given \langle fraction \rangle of the available space. \langle fraction \rangle is a value between 0 and 1.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}
\begin{tcolorbox}[title=My title,sidebyside,lefthand ratio=0.25]  
This is the upper \langle left-handed \rangle part.  
\tcblower  
This is the lower \langle right-handed \rangle part.  
\end{tcolorbox}
```

My title  
| This is the upper (left-handed) part. | This is the lower (right-handed) part. |

/\text{tcb/righthand ratio}=\langle fraction \rangle  
(no default, initially 0.5)  
Sets the width of the right-handed part to the given \langle fraction \rangle of the available space. \langle fraction \rangle is a value between 0 and 1.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}
\begin{tcolorbox}[title=My title,sidebyside,righthand ratio=0.25]  
This is the upper \langle left-handed \rangle part.  
\tcblower  
This is the lower \langle right-handed \rangle part.  
\end{tcolorbox}
```

My title  
| This is the upper (left-handed) part. | This is the lower (right-handed) part. |
If one side of a side-by-side box should be adapted to the width of its content, this width has to be computed beforehand. The following example uses a savebox \mysavebox to store the picture to determine its width.

```latex
\begin{tikzpicture}
\fill[red!20,draw=red!50!black] (0,0) node[below]{A} -- (3,1) node[right]{B} -- (1,4) node[above]{C} -- cycle;
\end{tikzpicture}
```

4.14 Embedding into the Surroundings

Typically, but not necessarily, a \texttt{tcolorbox} is put inside a separate paragraph and has some vertical space before and after it. This behavior is controlled by the keys \texttt{before} and \texttt{after}.

\begin{itemize}
\item \texttt{/tcb/before=⟨code⟩} (no default, initially see \texttt{/tcb/autoparskip})
  Sets the \texttt{⟨code⟩} which is executed before the colored box. It is not used for floating boxes. Also, it is not used, if the box follows a heading immediately and \texttt{/tcb/ignore nobreak \textsuperscript{\textregistered}P.\textsuperscript{75}} is set to \texttt{false}.
\item \texttt{/tcb/after=⟨code⟩} (no default, initially see \texttt{/tcb/autoparskip})
  Sets the \texttt{⟨code⟩} which is executed after the colored box. It is not used for floating boxes.
\end{itemize}

\texttt{/tcb/parskip} (style, no value)

Sets the keys \texttt{before} and \texttt{after} to values which are recommended, if the package \texttt{parskip} is used and there is no better idea for \texttt{before} and \texttt{after}.

\begin{verbatim}
\tcbset{parskip/.style={before={\par\pagebreak[0]\parindent=0pt}, after={\par}}}
\end{verbatim}

\texttt{/tcb/noparpskip} (style, no value)

Sets the keys \texttt{before} and \texttt{after} to values which are recommended, if the package \texttt{parskip} is \textit{not} used and there is no better idea for \texttt{before} and \texttt{after}.

\begin{verbatim}
\tcbset{noparskip/.style={before={\par\smallskip\pagebreak[0]\parindent=0pt}, after={\par\smallskip}}}
\end{verbatim}

\texttt{/tcb/autoparskip} (style, no value, initially set)

Tries to detect the usage of the package \texttt{parskip} and sets the keys \texttt{before} and \texttt{after} accordingly. Actually, the following is done:

\begin{itemize}
\item If the length of \texttt{\parindent} is greater than \texttt{0pt} at the beginning of the document, \texttt{/tcb/parskip} is executed. Here, the usage of package \texttt{parskip} is \textit{assumed}.
\item Otherwise, if the length of \texttt{\parindent} is not greater than \texttt{0pt} at the beginning of the document, \texttt{/tcb/noparpskip} is executed. Here, the absence of package \texttt{parskip} is \textit{assumed}.
\end{itemize}

\texttt{autoparskip} is the default for the package \texttt{tcolorbox}, if \texttt{before} or \texttt{after} are not changed otherwise.

\texttt{/tcb/nobeforeafter} (style, no value)

Abbreviation for clearing the keys \texttt{before} and \texttt{after}. The colored box is not put into a paragraph and there is no space before or after the box.

\begin{verbatim}
\tcbset{myone/.style={colback=LightGreen,colframe=DarkGreen, equal height group=nobefaf,width=\linewidth/4,nobeforeafter}}
\begin{tcolorbox}[myone,title=Box 1]Box 1\end{tcolorbox}
\begin{tcolorbox}[myone,title=Box 2]Box 2\end{tcolorbox}
\begin{tcolorbox}[myone,title=Box 3]Box 3\end{tcolorbox}
\begin{tcolorbox}[myone,title=Box 4]Box 4\end{tcolorbox}
\end{verbatim}
/tcb/baseline=(length) (no default, initially 0pt)
Used to set the \pgfsetbaseline value of the resulting tcolorbox.

\tcbset{colframe=red!50!white,width=4cm,nobeforeafter}
Some text \dotfill
\begin{tcolorbox}[baseline=3mm]
One line.
\end{tcolorbox}
\begin{tcolorbox}[baseline=3mm]
First line. Second line.
\end{tcolorbox}

\tcbset{colframe=red!50!white,width=4cm,nobeforeafter}
Some text \dotfill
\begin{tcolorbox}[box align=bottom]
One line.
\end{tcolorbox}
\begin{tcolorbox}[box align=bottom]
First line. Second line.
\end{tcolorbox}

\tcbset{colframe=red!50!white,width=4cm,nobeforeafter}
Some text \dotfill
\begin{tcolorbox}[box align=top]
One line.
\end{tcolorbox}
\begin{tcolorbox}[box align=top]
First line. Second line.
\end{tcolorbox}

/tcb/box align=(alignment) (style, no default, initially bottom)
Used to set the /tcb/baseline value of the resulting tcolorbox. Feasible values for (alignment) are:
- **bottom**: alignment with the box bottom,
- **top**: alignment with the box top,
- **center**: alignment with the box center,
- **base**: alignment with the box content base. This option is not applicable for a tcolorbox \textsuperscript{P.11} but for a \texttt{tcbox} \textsuperscript{P.13} only. It is an alias for /tcb/tcbox raise base \textsuperscript{P.87}.
Some text
\begin{tcolorbox}[box align=center]
One line.
\end{tcolorbox}
\begin{tcolorbox}[box align=center]
First line. Second line.
\end{tcolorbox}

Some text ......................... First line. Second line.
\begin{tcolorbox}[before skip=1cm, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[after skip=1cm, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[beforeafter skip=0pt, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[beforeafter skip=0pt, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

Some text.
\begin{tcolorbox}[beforeafter skip=0pt, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[beforeafter skip=0pt, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[beforeafter skip=0pt, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[beforeafter skip=0pt, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[beforeafter skip=0pt, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/\texttt{tcb}/before \texttt{skip}=(\texttt{glue}) \hspace{1cm} \text{(style, no default)}
Inserts some vertical space of the given \texttt{glue} before the colored box. This style sets /\texttt{tcb}/before *P.72*.

\begin{tcolorbox}[before skip=1cm, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[after skip=1cm, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

/\texttt{tcb}/after \texttt{skip}=(\texttt{glue}) \hspace{1cm} \text{(style, no default)}
Inserts some vertical space of the given \texttt{glue} after the colored box. This style sets /\texttt{tcb}/after *P.72*.

/\texttt{tcb}/beforeafter \texttt{skip}=(\texttt{glue}) \hspace{1cm} \text{(style, no default)}
Inserts some vertical space of the given \texttt{glue} before \textit{and} after the colored box. This style sets /\texttt{tcb}/before *P.72* and /\texttt{tcb}/after *P.72*.
/tcb/left skip=⟨length⟩  (style, no default, initially 0mm)
Inserts some horizontal space of the given ⟨length⟩ before the colored box. This style sets /tcb/grow to left by ↑P.78 with the negated ⟨length⟩, i.e. the bounding box and box width are changed.

\begin{tcolorbox}[left skip=1cm, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

This is a tcolorbox.

/tcb/right skip=⟨length⟩  (style, no default, initially 0mm)
Inserts some horizontal space of the given ⟨length⟩ after the colored box. This style sets /tcb/grow to right by ↑P.78 with the negated ⟨length⟩, i.e. the bounding box and box width are changed.

\begin{tcolorbox}[right skip=1cm, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

This is a tcolorbox.

/tcb/leftright skip=⟨length⟩  (style, no default)
Inserts some horizontal space of the given ⟨length⟩ before and after the colored box. This style changes the bounding box and the box width.

\begin{tcolorbox}[leftright skip=1cm, colframe=red!50!white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

This is a tcolorbox.

/tcb/ignore nobreak=true|false  (default true, initially false)
After a heading, \LaTeX{} tries to avoid a break by setting a \nobreak{} boolean value. Starting from version 3.33, the /tcb/before ↑P.72 respectively /tcb/before skip ↑P.74 settings are not used after a heading if /tcb/ignore nobreak is set to false. For an unbreakable box, /tcb/before nobreak is used instead. Further, a /tcb/breakable ↑P.297 box will also try to avoid a break between a heading and a directly following first part of a break sequence. Set /tcb/ignore nobreak to true, if \nobreak{} should be ignored as prior to version 3.33. Also, such a setting may be used locally to enforce the /tcb/before ↑P.72 setting.

/tcb/before nobreak=⟨code⟩  (no default, initially \noindent{})
Sets the ⟨code⟩ which is executed before the colored box if it is unbreakable, if /tcb/ignore nobreak is not set, and if the box follows a heading.
4.15 Bounding Box

Normally, every `tcolorbox` has a bounding box which fits exactly to the dimensions of the outer frame. Therefore, \LaTeX{} reserves exactly the space needed for the box. This behavior can be changed by enlarging (or shrinking) the bounding box. If the bounding box is enlarged, the `tcolorbox` will get some clearance around it. If the bounding box is shrunk, i.e. enlarged with negative values, the `tcolorbox` will overlap to other parts of the page. For example, the `tcolorbox` could be stretched into the page margin.

The following examples use `/tcb/show bounding box` \(^{P.145}\) to display the actual bounding box. For this, the library `arrows` has to be included and `/tcb/enhanced` \(^{P.169}\) has to be set.

```
\tcbset{colframe=blue!75!black,colback=white}
\begin{tcolorbox}[enlarge top initially by=-5mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[enlarge top initially by=5mm,enhanced,show bounding box]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

```
\tcbset{colframe=blue!75!black,colback=white}
\begin{tcolorbox}[enlarge bottom finally by=5mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[enlarge bottom finally by=-5mm,enhanced,show bounding box]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

```
\begin{tcolorbox}[enlarge top initially by=\length]
```
```
\end{tcolorbox}
```
```
\begin{tcolorbox}[enlarge bottom finally by=\length]
```
```
\end{tcolorbox}
```

/enlarge top initially by=\length\textbackslash

Enlarges the bounding box distance to the top of the box by \langle \textit{length} \rangle. If the box is breakable, only the first box of the break sequence gets enlarged. /tcb/enlarge top by \(^{P.77}\) overwrites this key.

/enlarge bottom finally by=\length\textbackslash

Enlarges the bounding box distance to the bottom of the box by \langle \textit{length} \rangle. If the box is breakable, only the last box of the break sequence gets enlarged. /tcb/enlarge bottom by \(^{P.77}\) overwrites this key.
/tcb/enlarge top at break by=⟨length⟩ (no default, initially 0mm)
Enlarges the bounding box distance to the top of the box by ⟨length⟩, if the box is /tcb/breakable^P.297. In this case, it is applied to middle and last parts in a break sequence. /tcb/enlarge top by overwrites this key.

/tcb/enlarge bottom at break by=⟨length⟩ (no default, initially 0mm)
Enlarges the bounding box distance to the bottom of the box by ⟨length⟩, if the box is /tcb/breakable^P.297. In this case, it is applied to first and middle parts in a break sequence. /tcb/enlarge bottom by overwrites this key.

/tcb/enlarge top by=⟨length⟩ (no default, initially 0mm)
Enlarges the bounding box distance to the top of the box by ⟨length⟩. /tcb/enlarge top initially by^P.76 and /tcb/enlarge top at break by are set to ⟨length⟩.

/tcb/enlarge bottom by=⟨length⟩ (no default, initially 0mm)
Enlarges the bounding box distance to the bottom of the box by ⟨length⟩. /tcb/enlarge bottom finally by^P.76 and /tcb/enlarge bottom at break by are set to ⟨length⟩.

/tcb/enlarge left by=⟨length⟩ (no default, initially 0mm)
Enlarges the bounding box distance to the left side of the box by ⟨length⟩.
\texttt{/tcb/enlarge by=⟨length⟩} (no default, initially 0mm)
Enlarges the bounding box distance to all sides of the box by \langle length \rangle.

\begin{tcolorbox}[enlarge by=5mm,enhanced,show bounding box]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\texttt{/tcb/grow to left by=⟨length⟩} (no default, initially 0mm)
Enlarges the current box width by \langle length \rangle and enlarges (shrinks) the bounding box distance to the left side of the box by \textminus \langle length \rangle. Also see \texttt{/tcb/left skip} \textsuperscript{P.75}.

\begin{tcolorbox}[width=5cm,grow to left by=2cm,enhanced,show bounding box]
This is a \textbf{tcolorbox} with a width of 7cm.
\end{tcolorbox}

\texttt{/tcb/grow to right by=⟨length⟩} (no default, initially 0mm)
Enlarges the current box width by \langle length \rangle and enlarges (shrinks) the bounding box distance to the right side of the box by \textminus \langle length \rangle. Also see \texttt{/tcb/right skip} \textsuperscript{P.75}.

\begin{tcolorbox}[grow to right by=2cm,grow to left by=1cm,enhanced,show bounding box]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
Floating box from \texttt{toggle enlargement}

This page is an odd page. Therefore, the left and right enlargements are not toggled (with some luck; otherwise use \texttt{forced}). This box stretches to the right margin on odd pages and to the left margin on even pages. The current document is one-sided – this feature makes sense for two-sided documents only.

\texttt{/tcb/toggle enlargement}=(\texttt{toggle preset}) \hspace{1cm} (default \texttt{evenpage}, initially \texttt{none})

According to the \texttt{(toggle preset)}, the left and the right enlargements of the bounding box are switched or not. Feasible values are:

- \texttt{none}: no switching.
- \texttt{forced}: the values of the left and right enlargement are switched.
- \texttt{evenpage}: if the page is an even page, the values of the left and right enlargement are switched. It is recommended that one use this setting in conjunction with \texttt{/tcb/check odd page}.

% \usepackage{changepage} for ‘check odd page’
\begin{tcolorbox}[toggle enlargement=none,enhanced,show bounding box]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[toggle enlargement=forced]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[toggle enlargement=evenpage,check odd page]
This page is an odd page. Therefore, the left and right enlargements are not toggled.
\end{tcolorbox}

\begin{tcolorbox}[colframe=red!60!black,colback=red!15!white,check odd page,fonttitle=\bfseries,title=Floating box from \texttt{toggle enlargement},width=0.5\textwidth,grow to right by=2cm,toggle enlargement=evenpage,float=t]
This page is an odd page. Therefore, the left and right enlargements are not toggled (with some luck; otherwise use \texttt{forced}). This box stretches to the right margin on odd pages and to the left margin on even pages. The current document is one-sided -- this feature makes sense for two-sided documents only.
\end{tcolorbox}
The following keys should not be used with breakable boxes or boxes with a lower part.

/tcb/shrink tight (style, no value, initially unset)
The total colored box is shrunk to the dimensions of the upper part. There should be no lower part and no title. This style sets the /tcb/boxsep to 0pt and other geometry keys to fitting values. This option is likely to be used with the following extrusion keys.

\tcbset{colframe=blue!75!black,colback=white,arc=0mm,boxrule=0.4pt, nobeforeafter,tcbbox raise base,shrink tight}
\begin{tcolorbox}
This is a \textbf{tcolorbox}.
\end{tcolorbox}

Lorem \tcb{ipsum} dolor sit amet, consectetuer adipiscing elit.

This is a tcolorbox.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit.

/tcb/extrude left by=(length) (style, no default, initially unset)
The (upper part of the) colored box is extruded by the given (length) to the left side. The inner width and the bounding box is kept unchanged and the operation is additive!

\tcbset{enhanced,colframe=red,colback=yellow!25!white, frame style={opacity=0.25},interior style={opacity=0.5}, nobeforeafter,tcbbox raise base,shrink tight,extrude by=2mm}

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. \tcb[extrude left by=1cm]{Curabitur} dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna.

/tcb/extrude right by=(length) (style, no default, initially unset)
The (upper part of the) colored box is extruded by the given (length) to the right side. The inner width and the bounding box is kept unchanged and the operation is additive!

\tcbset{enhanced,colframe=red,colback=yellow!25!white, frame style={opacity=0.25},interior style={opacity=0.5}, nobeforeafter,tcbbox raise base,shrink tight,extrude by=2mm}

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. \tcb[extrude right by=1cm]{Curabitur} dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna.
The (upper part of the) colored box is extruded by the given \( \langle \text{length} \rangle \) to the top side. The inner width and the bounding box is kept unchanged and the operation is additive!

\begin{tcbexisted}
\texttt{\textbackslash tcb\textbackslash extrude\ top\ by=\langle\text{length}\rangle \quad (style, \ no\ default, \ initially\ unset)}
\end{tcbexisted}

The (upper part of the) colored box is extruded by the given \( \langle \text{length} \rangle \) to the bottom side. The inner width and the bounding box is kept unchanged and the operation is additive!

\begin{tcbexisted}
\texttt{\textbackslash tcb\textbackslash extrude\ bottom\ by=\langle\text{length}\rangle \quad (style, \ no\ default, \ initially\ unset)}
\end{tcbexisted}

The (upper part of the) colored box is extruded by the given \( \langle \text{length} \rangle \) to all sides. The inner width and the bounding box is kept unchanged and the operation is additive!

\begin{tcbexisted}
\texttt{\textbackslash tcb\textbackslash extrude\ by=\langle\text{length}\rangle \quad (style, \ no\ default, \ initially\ unset)}
\end{tcbexisted}
4.16 Layered Boxes and Every Box Settings

A \texttt{tcolorbox} may contain another \texttt{tcolorbox} and so on. The package takes track of the nesting level using a counter \texttt{tcblayer}. Counter values may be used for doing some fancy things, but you should never change the counter value yourself.

The package takes special care for the first four layers or nesting levels, called managed layers. Here, footnote texts are administrated to find their intended place and specific layer dependent options may be set by changing /\texttt{tcb/every box on layer n}\textsuperscript{P.83}. If needed, the number of managed layers can be increased by setting /\texttt{tcbsetmanagedlayer}\textsuperscript{P.83} to a higher value than 4.

The following styles have a considerable influence on how layered boxes are processed. Note especially that nested boxes are getting a /\texttt{tcb/reset}\textsuperscript{P.90} by default. You can change this, but be prepared for suprises if you do.

If the defaults are \textit{not changed}, a \texttt{tcolorbox} gets its options in the following order. Following options overwrite preceding options.

1. On package load, all options are set to default values.
2. Every /\texttt{tcbset}\textsuperscript{P.12} command adds or changes options for the following boxes inside the current \TeX{} group.
3. While entering a \texttt{tcolorbox}, a /\texttt{tcb/every box on layer n}\textsuperscript{P.83} or /\texttt{tcb/every box on higher layers}\textsuperscript{P.83} option list is applied. With default settings this means:
   - For layer 1 (lowest layer), the /\texttt{tcb/every box} option list is applied. Not overwritten options given by a preceding /\texttt{tcbset}\textsuperscript{P.12} survive.
   - For layer 2 and above (nested boxes), a /\texttt{tcb/reset}\textsuperscript{P.90} followed by /\texttt{tcb/every box} option list is applied. Every resettable options given by a preceding /\texttt{tcbset}\textsuperscript{P.12} and by the surrounding box(es) are reset.
4. The \textit{⟨options⟩} given to the \texttt{tcolorbox} are applied. Or, if the box was generated by /\texttt{newtcolorbox}\textsuperscript{P.14} or friends, the \textit{⟨options⟩} given there are applied.
5. If the box was generated by /\texttt{newtcolorbox}\textsuperscript{P.14} or friends, some automated options are applied.

/\texttt{tcb/every box} \hspace{1cm} (style)

By default, this style is empty.

\begin{verbatim}
% default setting:
\texttt{tcbset\{}every box/.style={}\texttt{}}
\end{verbatim}

It may be changed by redefining this style.

\begin{verbatim}
% setting all boxes to be enhanced:
\texttt{tcbset\{}every box/.style={enhanced}\texttt{}}
\end{verbatim}

The alternative for setting something for every box (on every layer) is /\texttt{tcbsetforeverylayer}\textsuperscript{P.12}:

\begin{verbatim}
% setting all boxes to be enhanced:
\texttt{tcbsetforeverylayer\{}enhanced\texttt{}}
\end{verbatim}
/tcb/every box on layer n

Here, \( n \) has to be replaced by a number ranging from 1 to the highest managed layer number (4 by default).

% default settings:
\tcbset{
  every box on layer 1/.style={every box},
  every box on layer 2/.style={reset,every box},
  every box on layer 3/.style={reset,every box},
  every box on layer 4/.style={reset,every box},
}

/tcb/every box on higher layers

Higher layers are layers above the highest managed layer number (4 by default).

\tcbset{every box on higher layers/.style={reset,every box}}

/tcbsetmanagedlayer\{(number)\}

Replaces the highest managed layer number by \( \langle \text{number} \rangle \) where 4 is the default. This macro can only be used inside the preamble. Using a \( \langle \text{number} \rangle \) lower than 4 typically makes no sense, but is not forbidden.

\% \usepackage{lipsum}
% \tcbuselibrary{skins,breakable}
\tcbset{colframe=red!75!black,fonttitle=\bfseries,
  colback=red!5!white,
  every box/.style={enhanced,watermark text=\tetcblayer,
  before=\par\smallskip,after=\par\smallskip},
  every box on layer 2/.style={reset,every box,colback=yellow!10!white,
  drop fuzzy shadow}}
\begin{tcolorbox}[enhanced jigsaw,breakable,title=Layer 1 Box]
Here comes a footnote\footnote{Footnote from layer 1 box}.
\lipsum[2]
\begin{tcolorbox}[title=Layer 2 Box]
abc\footnote{The footnote of abc}
\end{tcolorbox}
\begin{tcolorbox}[title=Another Box,ams equation]
\tcbhighmath\{\sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty\}. \frac{1}{\langle n \rangle} = \text{infty}.
\end{tcolorbox}
\begin{tcolorbox}
Some text\footnote{Footnote from some text}.
\begin{tcolorbox}[title=Yet Another Box]
\tcboxfit[height=2cm]\{\lipsum[1]\}
My text.
\begin{tcolorbox}
Another lipsum text\footnote{A lipsum text}. \lipsum[3]
\begin{tcolorbox}[title=Layer 4,colframe=blue,colback=white]
Layer 4\footnote{Layer 4 footnote}
\end{tcolorbox}
The End\footnote{Last footnote}.
\end{tcolorbox}
\end{tcolorbox}
\end{tcolorbox}

Layer 1 Box

Here comes a footnote\footnote{Footnote from layer 1 box}. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae

Layer 2 Box

abc\(^a\)

\(^a\)The footnote of abc

Another Box

\[
\sum_{n=1}^{\infty} \frac{1}{n} = \infty.
\]

Some text\(^b\).

Yet Another Box


My text.


Layer 4

Layer 4\(^a\)

\(^a\)Layer 4 footnote

The End\(^b\).

\(^a\)A lipsum text

\(^b\)Last footnote

\(^a\)Footnote from layer 1 box

\(^b\)Footnote from some text
4.17 Capture Mode

\( /\text{tcb/capture}=\langle \text{mode} \rangle \)  
(no default, initially minipage)

The capture \( \langle \text{mode} \rangle \) defines how the box content is processed. Feasible values for \( \langle \text{mode} \rangle \) are:

- **minipage:**
  This is the default \( \langle \text{mode} \rangle \) for \texttt{tcolorbox}``P.11. The content may have an upper and a lower part. Optionally, the box can be \( /\text{tcb/breakable} \)` `P.297. The box content is put into a minipage or into something similar to a minipage.

- **hbox:**
  This is the default \( \langle \text{mode} \rangle \) for \texttt{tcbox}``P.13. The content cannot have a lower part and cannot be broken. The colored box is sized according to the dimensions of the content. A shortcut to set this mode is \( /\text{tcb/hbox} \).

- **fitbox:** (needs the \texttt{fitting} library)
  This is the default \( \langle \text{mode} \rangle \) for \texttt{tcolorboxfit}``P.315. The content cannot have a lower part and cannot be broken. The content is sized according to the dimensions of the colored box. A shortcut to set this mode is \( /\text{tcb/fit} \)` `P.317.

\[\texttt{\textbackslash tcbset\{colframe=blue!75!black,colback=white\}}\]
\[\begin{\texttt{tcolorbox}[\langle \text{mode} \rangle=\text{minipage}]\]
This is a tcolorbox.
\end{\texttt{tcolorbox}}\]

\[\begin{\texttt{tcolorbox}[\langle \text{mode} \rangle=\text{hbox}]\]
This is a tcolorbox.
\end{\texttt{tcolorbox}}\]

\[\begin{\texttt{tcolorbox}[\langle \text{mode} \rangle=\text{fitbox},height=9mm]\% \text{needs the 'fitting' library}\]
This is a tcolorbox.
\end{\texttt{tcolorbox}}\]

\( /\text{tcb/hbox} \)  
(style, no default)

Shortcut for \texttt{capture=\text{hbox}}.

\[\texttt{\textbackslash tcbset\{colframe=blue!75!black,colback=white\}}\]
\[\begin{\texttt{tcolorbox}[\langle \text{mode} \rangle=\text{hbox}]\]
This is a tcolorbox.
\end{\texttt{tcolorbox}}\]

\( /\text{tcb/minipage} \)  
(style, no default)

Shortcut for \texttt{capture=\text{minipage}}.
4.18 Text Characteristics

/\textcolor{blue}{tcb/parbox=true|false} (default \textcolor{blue}{true}, initially \textcolor{blue}{true})

The text inside a \textcolor{blue}{tcolorbox} is formatted using a \LaTeX\ \textcolor{blue}{minipage} if the box is unbreakable. If breakable, the box tries a mimicry of a \textcolor{blue}{minipage}. In a \textcolor{blue}{minipage} or \textcolor{blue}{parbox}, paragraphs are formatted slightly different as the main text. If the key value is set to \textcolor{blue}{false}, the normal main text behavior is restored. In some situations, this has some unwanted side effects. It is recommended that one use this experimental setting only where you really want to have this feature.

```latex
\% \usepackage{lipsum} \% preamble
\tcbsset{width=(\linewidth-2mm)/2,nobeforeafter,arc=1mm,
colframe=blue!75!black,colback=white,fonttitle=\bfseries,fontupper=\small,
left=2mm,right=2mm,top=1mm,bottom=1mm,equal height group=parbox}
\begin{tcolorbox}[parbox,adjusted title={parbox=true (normal)}]
\lipsum[1-2]
\end{tcolorbox}\hfill
\begin{tcolorbox}[parbox=false,adjusted title={parbox=false}]
\lipsum[1-2]
\end{tcolorbox}
```

<table>
<thead>
<tr>
<th>\textcolor{blue}{parbox=true (normal)}</th>
<th>\textcolor{blue}{parbox=false}</th>
</tr>
</thead>
<tbody>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------</td>
</tr>
</tbody>
</table>

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/tcb/hyphenationfix=true|false

Long words at the beginning of paragraphs in very narrow boxes will not be hyphenated using pdflatex. This problem is circumvented by applying the hyphenationfix option.

\begin{tcolorbox}
Rechnungsadjunktentochter.
Statthalttereikonzipist.
\end{tcolorbox}

\begin{tcolorbox}[hyphenationfix]
Rechnungsadjunktentochter.
Statthalttereikonzipist.
\end{tcolorbox}

parbox=false and hyphenationfix should not be used together. They are targeting different box types and they do not blend very well.

4.19 Files

\texttt{/tcb/tempfile=⟨file name⟩}

Sets \texttt{⟨file name⟩} as name for the temporary file which is used inside \texttt{tcbwritetemp} \textsuperscript{P.98} and \texttt{tcbusetemp} \textsuperscript{P.98} implicitly.

4.20 \texttt{tcb} Specials

The following options are applicable for \texttt{tcb} \textsuperscript{P.13} and \texttt{tcbmath} \textsuperscript{P.274} only.

\texttt{/tcb/tcbox raise=⟨length⟩}

(no default, initially \texttt{Opt})

 Raises the \texttt{tcbox} \textsuperscript{P.13} by the given \texttt{⟨length⟩}.

\begin{tcolorbox}
\texttt{\tcset{colframe=blue!75!black, fontupper=\normalsize, colback=blue!5!white, width=4cm}}
\begin{tcolorbox}
Rechnungsadjunktentochter.\par
Statthalttereikonzipist.
\end{tcolorbox}
\begin{tcolorbox}[hyphenationfix]
Rechnungsadjunktentochter.\par
Statthalttereikonzipist.
\end{tcolorbox}
\end{tcolorbox}

\texttt{/tcb/tcbox raise base}

(style, no value, initially unset)

 Raises the \texttt{tcbox} \textsuperscript{P.13} such that the base of its content matches the base of the environmental line; see example above.

\texttt{/tcb/on line}

(style, no value, initially unset)

 Combines \texttt{/tcb/tcbox raise base} with \texttt{/tcb/nobeforeafter} \textsuperscript{P.72}. The resulting box behaves analogue to \texttt{fbox}.
4.21 Counters, Labels, and References

/tcb/phantom={\langle code \rangle} (no default, initially unset)

The \langle code \rangle is put in a box at the upper left corner of the tcolorbox. If the tcolorbox is breakable, the \langle code \rangle is executed for the first box of the break sequence only. If there already was some phantom code given, the new \langle code \rangle is appended.

The \langle code \rangle is intended to be used for counter stepping, labelling, and related operations which do not produce visible text.

- The \langle code \rangle is executed before the title and box content, i.e. counter values are ensured to be increased before usage.
- Labels are ensured to reference the correct page number.
- The \langle code \rangle is executed only once even during fitting operations for title and box content.
- In combination with the hyperref package, the hyper anchor is set to the upper left corner of the tcolorbox, i.e. links inside the pdf document will jump to the box pleasantly.
- Since the \langle code \rangle is executed inside a \TeX{} group, only global operations can survive this group.

Examples for the phantom usage are given in Section 13.9 from page 266, e.g. Example 13.1 on page 267.

/tcb/nophantom (no value, initially set)

Removes the phantom code if set before.

/tcb/label={\langle marker \rangle} (no default, initially unset)

The \langle marker \rangle is set as label text for a reference with the \ref macro. Typically, this option is used for numbered boxes, see Subsection 5.1 from page 92, e.g. /tcb/new/auto counter^P.92.

/tcb/phantomlabel={\langle marker \rangle} (no default, initially unset)

Equivalent to /tcb/label for an unnumbered box. A \phantomsection from the package hyperref is used to set a correct hyperlink target. This is not needed for a numbered box.

/tcb/label type={\langle type \rangle} (no default, initially unset)

This option key can be used only in conjunction with the cleveref package [5] which has to be loaded separately. \langle type \rangle has to be a cross-reference type known to cleveref like theorem, algorithm, result, etc. References made with cleveref will use this type. Note that using label type will result in compilation errors, if cleveref is not loaded. For an example, see Theorem 14.3.5 on page 291.

/tcb/no label type (no value, initially set)

Removes a /tcb/label type, if set before.

/tcb/step={\langle counter \rangle} (no default, initially unset)

Shortcut for phantom={\refstepcounter{#1}}. The given \langle counter \rangle is increased and ready for labelling. This option is not needed when using the convenient automated numbering introduced with version 2.40, see Subsection 5.1 from page 92.

/tcb/step and label={\langle counter \rangle}{\langle marker \rangle} (no default, initially unset)

Shortcut for using /tcb/step and /tcb/label. This option is not needed when using the convenient automated numbering introduced with version 2.40, see Subsection 5.1 from page 92.
If the «list of tcolorbox(es)» feature described in Subsection 5.2 from page 97 is used, this
key describes the ⟨text⟩ for an entry into the generated list, e.g.

\list entry={\protect\numberline{\thetcbcounter}My beautiful Example}

See Section 13.9 from page 266 for a complete example.

\list text=(text) (style, no default)
This is a shortcut for setting \list entry to \protect\numberline{\thetcbcounter}⟨text⟩. So, the following settings are identical:

\list text={My beautiful Example},
\list entry={\protect\numberline{\thetcbcounter}My beautiful Example}

See Section 13.9 from page 266 for a complete example.

\add to listanitize{\protect\numberline{\thetcbcounter}⟨text⟩}{⟨text⟩}{⟨entry text⟩}

\check odd page=true|false (default true, initially false)
If set to true, the even/odd page testing from the package changepage is applied. The
\check even|odd check and the \check left and right check will use the \ifoddpage macro from this package or another package like ifoddpage. This
options is independent from \check phantom. Note that you have to include the package
changepage by hand:\n
\usepackage{changepage}
\strictpagecheck

The macro \ifoddpage can be used inside overlay or watermark code to test if the box is
on an odd page. This will work also for boxes in a break sequence. Note that you cannot
use the test inside the normal box content.

\usepackage{changepage}
\textbf{\textcolor{red}{\check odd page}}
\textbf{\textcolor{red}{\check left}}
\textbf{\textcolor{red}{\check right}}
\textbf{\textcolor{red}{\check phantom}}


3If changepage is not included, a compilation error will arise.
4.22 Externalization

If the externalization library of the tikz package is used and /tcb/graphical environment^P.105 is set to tikzpicture, a tcolorbox could trigger the externalization process which will arise a compilation error.

To avoid this, there are two possible strategies:

- Ensure, that \tikzexternaldisable is set before a tcolorbox is used. If you typically use the pattern \tikzexternalenable some picture \tikzexternaldisable, there is nothing to care about.

- If externalization is enabled globally, use /tcb/shield externalize to shield any tcolorbox. The preamble code could look like this:

```latex
\usetikzlibrary{external}
\tikzexternalize
\tcbset{shield externalize}
```

/tcb/shield externalize=true|false (default true, initially false)

If set to true, the drawing part of the tcolorbox is not being externalized which is a good thing at the current state of art. Nevertheless, if the tcolorbox contains a tikzpicture, this picture is still externalized. Pictures drawn with help of /tcb/tikz upper^P.58 or alike are not externalized.

If a tcolorbox is used inside a node of an encircling tikzpicture which is externalized, do not use \tikzexternaldisable in front of the tcolorbox. /tcb/shield externalize is deactivated automatically inside a tikzpicture.

/tcb/external=(file name) (no default, initially unset)

Convenience option which calls \tikzsetnextfilename{(file name)}. Typically, it may be used inside the option list of a tcolorbox to set the externalization (file name) for the first tikzpicture which is discovered inside the box content. The package tikz [20] or the library \skins has to be loaded to use this option. Additionally, \usetikzlibrary{external} has to be used.

/tcb/remake=true|false (default true, initially false)

Convenience option which calls /tikz/external/ REMAKE next. Typically, it may be used inside the option list of a tcolorbox to force the remake of the first tikzpicture which is discovered inside the box content. The package tikz [20] or the library \skins has to be loaded to use this option. Additionally, \usetikzlibrary{external} has to be used.

4.23 Miscellaneous

/tcb/reset (no value, initially set)

Sets (nearly) all tcolorbox settings (including loaded libraries) back to their default values plus any settings given by \tcbsetforeverylayer^P.12, /tcb/savedelimiter^P.24 and /tcb/capture^P.85 keep their values. Also, all raster values (see Section 12 on page 222) are not resetted.

This option is useful for boxes in boxes where the inner box should not inherit the settings of the outer box. Note that for boxes inside boxes the reset is done automatically, if the standard settings of the package are used (v2.40 and above), see Section 4.16 from page 82.
\documentclass{beamer}
\usepackage[many]{tcolorbox}
\begin{document}
\begin{frame}
\begin{tcolorbox}[title=My title,fonttitle=\bfseries,
  enhanced,colframe=red!50!black,colback=red!10,colbacktitle=red,
  sidebyside,righthand width=3cm,
  lowerbox=invisible,lower separated=false,
  drop lifted shadow,
  only=<1>{colbacktitle=yellow,coltitle=red!50!black,colframe=red},
  only=<3>{colback=yellow!50,watermark text={Attention!}},
  only=<3->{lowerbox=visible} ]
  This is a test.
  \begin{itemize}[<+->]
\item One
\item Two
\item \alert<3>{Three}
\item Four
  \end{itemize}
\begin{equation*}
\int\limits_{1}^{x} \frac{1}{t}~dt = \ln(x).
\end{equation*}
\end{tcolorbox}
\end{frame}
\end{document}
5 Initialization Option Keys

The initialization options are only applicable for the generation of new environments and commands based on \tcolorbox and friends. Particularly, they can be used for

- \newtcolorbox\(^{P.14},\)
- \newtcbbox\(^{P.15},\)
- \newtcblisting\(^{P.237},\)
- \newtcbinputlisting\(^{P.239},\)
- \newtcbtheorem\(^{P.272},\) and
- \newtcbxfit\(^{P.316}.$

Typically, these options may generate counters and alike. It is strongly recommended that one use initialization options inside the preamble only. Otherwise, you may get trouble when using \LaTeX\’s \include features.

5.1 Numbered Boxes

Counters assigned using the initialization options are administrated automatically. Especially, they are increased for each new box. Independent from the real counter name, the counter value can be referenced by \tthetcbcounter, e.g. inside the title of the box. The real counter name is stored inside \tcbcounter.

/tcb/new/auto counter
(no value, initially unset)

Creates a new counter automatically. With \tcb/new/number format\(^{P.94}\) and \tcb/new/number within\(^{P.94}\), the appearance and behavior of the counter can be changed. The counter value is referenced by \tthetcbcounter.

\begin{pabox}[label={myautocounter}]{Title with number}
This box is automatically numbered with \ref{myautocounter} on page \pageref{myautocounter}. Inside the box, the \tthetcbcounter\ can also be referenced by |\tthetcbcounter|.
The real counter name is \texttt{\tcb@cnt@pabox}.
\end{pabox}

Examp. 5.1: Title with number

This box is automatically numbered with 5.1 on page 92. Inside the box, the 5.1 can also be referenced by \tthetcbcounter. The real counter name is \texttt{\tcb@cnt@pabox}. 92
Here, a counter from another \texttt{tcolorbox} is reused. Note that the settings for \texttt{/tcb/new/number format} \texttt{^P.94} and \texttt{/tcb/new/number within} \texttt{^P.94} are inherited and cannot be changed. The counter value is referenced by \texttt{\thetcbcounter}.

\begin{mybox}[label={myusecounterfrom}]{Title with continued number}
This box is automatically numbered with \cite{myusecounterfrom} on page \pageref{myusecounterfrom}. Inside the box, the \texttt{\thetcbcounter} can also be referenced by |\texttt{\thetcbcounter}|.
The real counter name is \texttt{\tcbcounter}.
\end{mybox}

Some Box 5.2: Title with continued number
This box is automatically numbered with 5.2 on page 93. Inside the box, the 5.2 can also be referenced by \texttt{\thetcbcounter}. The real counter name is \texttt{tcb@cnt@pabox}.

\begin{mybox}[label={myusecounter}]{Title with LaTeX number}
This box is automatically numbered with \cite{myusecounter} on page \pageref{myusecounter}. Inside the box, the \texttt{\thetcbcounter} can also be referenced by |\texttt{\thetcbcounter}|.
The real counter name is \texttt{\tcbcounter}.
\end{mybox}

Some Box A: Title with \LaTeX{} number
This box is automatically numbered with A on page 93. Inside the box, the A can also be referenced by \texttt{\thetcbcounter}. The real counter name is \texttt{myexample}.

An existing \LaTeX{} \texttt{counter} is used for numbering. In contrast to \texttt{/tcb/new/use counter}, the options \texttt{/tcb/new/number format} \texttt{^P.94} and \texttt{/tcb/new/number within} \texttt{^P.94} are ignored. Use this for counters which are already configured outside the \texttt{tcolorbox} package, e.g. the standard \texttt{figure} counter.

The created boxes are not numbered. This is the default. The option may be used to overrule a previous option.
/tcb/new/number within=(counter) (no default, initially unset)
The automatic counter is set to zero, if \langle counter \rangle is increased. Additionally, during output, the value of \langle counter \rangle is prepended to the value of the automatic counter.
To preprend the automatic counter with the chapter number and to reset it with every new chapter, use:

number within=chapter

See /tcb/new/use counter \textsuperscript{P.93} for a complete example.

/tcb/new/number format=(format macro) (no default, initially \arabic)
Declares the format of the automatic counter. The \langle format macro \rangle can be any valid \LaTeX{} number formatting macro like \arabic, \roman{}, etc.
To display the counter value in large roman numbers, use:

number format=\Roman

See /tcb/new/auto counter \textsuperscript{P.92} for a complete example.

/tcb/new/number freestyle=(code) (no default, initially unset)
Allows advanced control over the complete number format. This option overrules the format given by /tcb/new/number within and /tcb/new/number format. Nevertheless, you can combine it with /tcb/new/number within to get the desired reset property.
The \langle code \rangle is some formatting code which should contain \tcbcounter to reference the automated counter. Since this \langle code \rangle is expanded, you have to secure each macro with \noexpand with exception of \tcbcounter.

\begin{verbatim}
\newtcolorbox{auto counter,number within=section,
  number freestyle={(Q/\noexpand\thesection/\noexpand\Alph{tcbcounter})},
  }{phbox}[2][2]{
  colback=yellow!15!white,colframe=blue!75!black,fonttitle=bfseries,
  title=Question~\thetcbcounter: #2,#1}
\end{verbatim}

\begin{verbatim}
\begin{phbox}{label={myfreestyle}}{Title with freestyle number}
This box is automatically numbered with \texttt{\ref{myfreestyle}} on page \texttt{\pageref{myfreestyle}}. Inside the box, the \texttt{\thetcbcounter} can also be referenced by \texttt{\thetcbcounter}. The real counter name is \texttt{\texttt{tcb@cnt@phbox}}.
\end{phbox}
\end{verbatim}

\textbf{Definition in the preamble:}

\begin{verbatim}
\begin{phbox}{label={myfreestyle}}{Title with freestyle number}
This box is automatically numbered with \texttt{\ref{myfreestyle}} on page \texttt{\pageref{myfreestyle}}. Inside the box, the \texttt{\thetcbcounter} can also be referenced by \texttt{\thetcbcounter}. The real counter name is \texttt{\texttt{tcb@cnt@phbox}}.
\end{phbox}
\end{verbatim}
The following options /tcb/new/crefname and /tcb/new/Crefname need to be set inside the preamble.

/tcb/new/crefname={(singular)\{(plural)\}} (no default, initially unset)
This option key can be used only in conjunction with the cleveref package [5] which has to be loaded separately. It creates a cross-reference type for the new tcolorbox'es, where the lowercase ⟨singular⟩ and ⟨plural⟩ forms of the cross-reference are given. This type is the environment or macro name and /tcb/label type ^P.88 is set automatically. See /tcb/label type ^P.88 and [5] for more information.

/U 2014-12-01 /tcb/new/Crefname={(singular)\{(plural)\}} (no default, initially unset)
This option key can be used only in conjunction with the cleveref package [5] which has to be loaded separately. It creates a cross-reference type for the new tcolorbox'es, where the uppercase ⟨singular⟩ and ⟨plural⟩ forms of the cross-reference are given. This type is the environment or macro name and /tcb/label type ^P.88 is set automatically. See /tcb/label type ^P.88 and [5] for more information.

Definition in the preamble:
% \usepackage{cleveref}
\newtcolorbox[^auto counter,number within=section,\
crefname={bluebox}{blueboxes}]%\
{mybluebox}[2][\{colback=blue!5!white,colframe=blue!75!black,fonttitle=\bfseries,\
title=Bluebox \thetcbcounter: #2,#1}\
% \usepackage{varioref}% \usepackage{cleveref}
\begin{mybluebox}[label={myreference}]{My title}
This is an example.
\end{mybluebox}
\Cref{myreference}, \cref{myreference}.\%
\Cpageref{myreference}, \cpageref{myreference}.\%
\nameCref{myreference}, \namecref{myreference}.\%
With \texttt{varioref}:\%
\Vref{myreference}, \vref{myreference}.\%
\Vref*{myreference}, \vref*{myreference}.

Bluebox 5.1: My title
This is an example.

Bluebox 5.1, bluebox 5.1.
Page 95, page 95.
Bluebox, bluebox.
5.1, 95.
With varioref:
Bluebox 5.1, bluebox 5.1.
Bluebox 5.1, bluebox 5.1.
Used to comfortably blend into an existing schema of naming and numbering for some selected cases. For example, a tcolorbox can be used to display and entitle an image pretending to be a standard figure environment. Here, \texttt{/tcb/title} \texttt{P.17} is used instead of the standard \texttt{\caption} and \texttt{/tcb/list text} \texttt{P.89} can be used instead of the optional parameter of the standard \texttt{\caption}.

Feasible values for \texttt{⟨name⟩} are:

- **figures**: blend into the standard \texttt{figure} environment.
- **tables**: blend into the standard \texttt{table} environment.
- **listings**: blend into the standard \texttt{lstlistings} environment of the package \texttt{listings} [6].

Note that \texttt{blend into=listings} can only be used in the document content or, preferably, inside a \texttt{\AtBeginDocument} clause! Using it without \texttt{\AtBeginDocument} inside the preamble does not work since the \texttt{listings} packages initializes its counter also inside \texttt{\AtBeginDocument}.

---

\begin{figure}[htb]
\centering
\includegraphics[height=4cm]{lichtspiel.jpg}
\caption{A standard figure}
\end{figure}

\newtcolorbox[blend into=figures]{myfigure}[2]{float=htb,capture=hbox,
title={#2},every float=\centering,#1}

\begin{myfigure}{A tcolorbox figure}
\includegraphics[height=4cm]{lichtspiel.jpg}
\end{myfigure}

![Figure 1: A standard figure](lichtspiel.jpg)

![Figure 2: A tcolorbox figure](lichtspiel.jpg)
5.2 Lists of \texttt{tcolorbox}es

For figures and tables, \LaTeX provides the \texttt{\listoffigures} and \texttt{\listoftables} commands to create lists of these numbered entities. Also, a \texttt{tcolorbox} can be part of such a kind of list.

1. Assign a list \texttt{(name)} by the \textit{initialization} option \texttt{/tcb/new/list inside}.

2. Optionally, a new \texttt{(type)} for list entries may be assigned by the \textit{initialization} option \texttt{/tcb/new/list type}.

3. List entries a generated automatically within each \texttt{tcolorbox} using the above initialization.
   - If \texttt{/tcb/list entry^^P.89} is set, the entry is generated with it.
   - Otherwise, if \texttt{/tcb/title^^P.17} is set, the entry is generated with it.
   - Otherwise, the entry is generated with the current number and the environment name.

4. The generated list is displayed by \texttt{\tcblistof}.

\texttt{/tcb/new/list inside=\langle name\rangle} \quad (no default, initially unset)

Assigns a list or contents file to the generated \texttt{tcolorbox}es. Entries to this list are saved to a file which gets the \texttt{(name)} as file name extension. The list is referenced by this name in \texttt{\tcblistof}. For example:

\begin{verbatim}
list inside=exam
\end{verbatim}

See Section 13.9 from page 266 for a complete example.

\texttt{/tcb/new/list type=\langle type\rangle} \quad (no default, initially \texttt{tcolorbox})

Optionally, some \texttt{(type)} can be assigned to the list entries. For a new \texttt{(type)}, a macro \texttt{\l@\langle type\rangle} has to exist which controls the format of the list entry. The default type is defined by

\begin{verbatim}
\newcommand*{\l@tcolorbox}{\@dottedtocline{1}{1.5em}{2.3em}}
\end{verbatim}

This is identical to the \texttt{\l@section} setting of \LaTeX. \texttt{\l@tcolorbox} can be redefined or a new \texttt{(type)} can be assigned.

\texttt{\tcblistof[\langle macro\rangle]{\langle name\rangle}\{\langle title\ text\rangle\}}

Displays the generated list of \texttt{tcolorbox}es with the given \texttt{(name)}. The heading is generated by \texttt{\langle macro\rangle}\{\texttt{(title\ text)}\} where \texttt{\section} is the default setting for \texttt{\langle macro\rangle}.

To display the list inside a subsection, use for example:

\begin{verbatim}
\tcblistof[\\texttt{subsection}]{exam}\{List\ of\ Exercises\}
\end{verbatim}

The result of the example is found as Subsection 13.10 on page 269.

The core of the list is generated by \texttt{\@starttoc{\langle name\rangle}} which can be wrapped into an own macro.
6 Saving and Loading of Verbatim Texts

The following macros are slightly modified versions of the original macros from the known packages \texttt{moreverb} and \texttt{verbatim}. They are used implicitly inside of a \texttt{tcolorbox} environment, but they can be used outside also.

\begin{tcbverbatimwrite}{⟨file name⟩}
⟨environment content⟩
\end{tcbverbatimwrite}

Saves the \texttt{⟨environment content⟩} to a file named by \texttt{⟨file name⟩}. \TeX{} macros inside the environment are not expanded.

\begin{tcbverbatimwrite}{\jobname\_verbexp.tex}
This text is saved \textit{as is}.
\end{tcbverbatimwrite}

Now, we are using the file:
\input{\jobname\_verbexp.tex}

This environment may be used inside an own environment. Note, that inside the environment definition \texttt{tcbverbatimwrite} has to be used instead of \begin{tcbverbatimwrite} and \end{tcbverbatimwrite} instead of \end{tcbverbatimwrite}.

\begin{myverbatim}
This is the text which is saved by my own environment.
\end{myverbatim}

Now, we are using the file:
\input{\jobname\_myverb.tex}

\begin{tcbwritetemp}
⟨environment content⟩
\end{tcbwritetemp}

Has the same function as \texttt{tcbverbatimwrite}, but uses the key value of \texttt{tempfile} for the file name.

\begin{tcbwritetemp}
This text is saved \textit{as is}.
\end{tcbwritetemp}

Now, we are using the file:
\texttt{tcbusetemp}

\texttt{tcbusetemp}

Loads the current temporary file which was saved by \texttt{tcbwritetemp}.
7 Recording

The package provides some macros and options to take records during compilation. This is done by \TeX\ file operations to save some data to a file for later usage. The main application scenario is depicted in Section 7.3 on the next page where informations about example solutions are recorded and read again in Section 7.4 on page 103.

7.1 Makros

\begin{verbatim}
\tcbstartrecording[(file name)]
\end{verbatim}

Opens a file denoted by \textit{(file name)} for writing the records. The default file name is \jobname.records. See Section 7.3 on the next page for an example application.

\begin{verbatim}
\tcbrecord{(content)}
\end{verbatim}

Records any \textit{(content)} to the record file. \tcbrecord is implemented as \immediate\write. \tcbstartrecording has to be called before; otherwise, \tcbrecord is silently ignored.

\begin{verbatim}
\tcbrecord{\string\solution{thetcbcounter}{solutions/exercise-thetcbcounter.tex}}
\end{verbatim}

\begin{verbatim}
\tcbstoprecording
\end{verbatim}

Closes the current record file which was opened by \tcbstartrecording before.

\begin{verbatim}
\tcbinputrecords[(file name)]
\end{verbatim}

Opens a file denoted by \textit{(file name)} for reading the records via \input. The default file name is the name of the last used record file for saving. \tcbstoprecording has to be called before.

7.2 Options

\begin{verbatim}
/\tcb/record=\langle content\rangle
\end{verbatim}

(style, no default)

Records any \textit{(content)} to the record file, see \tcbrecord. This key can be used several times to write several lines.

\begin{verbatim}
record=\langle content\rangle
\end{verbatim}

\begin{verbatim}
/\tcb/no\ recording
\end{verbatim}

Disables \tcbrecord and /\tcb/record inside the current group.
7.3 Example: Exercises

The following application example creates exercises and their corresponding solutions. Each pair is generated inside a single \texttt{tcolorbox} where the solution is given below \texttt{tcbhover}\textsuperscript{11}. For every example, the solution part is saved by \texttt{/tcb/savelowerto}\textsuperscript{22} to a file. The saving is recorded using \texttt{/tcb/record}\textsuperscript{99}. To enlighten the possibilities, the second exercise has no solution. Finally, the solutions are input in Section 7.4 on page 103.

\textit{Definition in the preamble:}

\begin{verbatim}
\% \tcbusetlibrary{skins,xparse}
\newtcolorbox[auto counter,number within=section]{exercise}{+O{}}{
  enhanced,colframe=green!20!black,colback=yellow!10!white,coltitle=green!40!black,
  fonttitle=\bfseries,
  underlay={\begin{tcbclipinterior}
  \shade[inner color=green!80!yellow,outer color=yellow!10!white]
  (interior.north west) circle (2cm);
  \draw[help lines,step=5mm,yellow!80!black,shift={(interior.north west)}]
  (interior.south west) grid (interior.north east);
  \end{tcbclipinterior}},
  title={Exercise~\thetcbcounter:},
  label={exercise@\thetcbcounter},
  attach title to upper=quad,
  after upper={\par\hfill\textcolor{green!40!black}{\itshape Solution on page~\pageref{solution@\thetcbcounter}}},
  lowerbox=ignored,
  savelowerto=solutions/exercise-\thetcbcounter.tex,
  record={\string\solution{\thetcbcounter}{solutions/exercise-\thetcbcounter.tex}},
  #1}
\newtcolorbox{\solution}{mm}{
  enhanced,colframe=red!20!black,colback=yellow!10!white,coltitle=red!40!black,
  fonttitle=\bfseries,
  underlay={\begin{tcbclipinterior}
  \shade[inner color=red!50!yellow,outer color=yellow!10!white]
  (interior.north west) circle (2cm);
  \draw[help lines,step=5mm,yellow!80!black,shift={(interior.north west)}]
  (interior.south west) grid (interior.north east);
  \end{tcbclipinterior}},
  title={Solution of Exercise~\ref{exercise@#1} on page~\pageref{exercise@#1}:},
  phantomlabel={solution@#1},
  attach title to upper=par,
  }{\input{#2}}
\tcbset{no solution/.style={no recording,after upper=}}
\tcbstartrecording
\begin{exercise}
Compute the derivative of the following function:
\begin{equation*}
f(x)=\sin((\sin x)^2)
\end{equation*}
\tcblower
The derivative is:
\begin{align*}
f'(x) &= \left( \sin((\sin x)^2) \right)' \\
&= \cos((\sin x)^2) 2\sin x \cos x.
\end{align*}
\end{exercise}
\end{verbatim}
\begin{exercise}[no solution]
It holds:
\begin{equation*}
\frac{d}{dx}\left(\ln|x|\right) = \frac{1}{x}.
\end{equation*}
\end{exercise}

\begin{exercise}
Compute the derivative of the following function:
\begin{equation*}
f(x)=(\sin(\sin x))^2
\end{equation*}
The derivative is:
\begin{align*}
f'(x) &= \left( (\sin(\sin x))^2 \right)'
= 2\sin(\sin x)\cos(\sin x)\cos x.
\end{align*}
\end{exercise}

\begin{exercise}
Compute the derivative of the following function:
\begin{equation*}
f(x)=\sqrt{x^3-6x^2+2x}
\end{equation*}
The derivative is:
\begin{align*}
f'(x) &= \left( \sqrt{x^3-6x^2+2x} \right)'
= \frac{3x^2-12x+2}{2\sqrt{x^3-6x^2+2x}}.
\end{align*}
\end{exercise}

\begin{exercise}
Compute the derivative of the following function:
\begin{equation*}
f(x)=\left(\frac{2+3x}{1-2x}\right)^3
\end{equation*}
The derivative is:
\begin{align*}
f'(x) &= \left( \left(\frac{2+3x}{1-2x}\right)^3 \right)'
= 3 \left(\frac{2+3x}{1-2x}\right)^2 \frac{(1-2x)3-(2+3x)(-2)}{(1-2x)^2}
= \frac{21(2+3x)^2}{(1-2x)^4}.
\end{align*}
\end{exercise}

\begin{exercise}
Compute the derivative of the following function:
\begin{equation*}
f(x)=\frac{\cos x}{(\tan 2x)^2}
\end{equation*}
The derivative is:
\begin{align*}
f'(x) &= \left( \frac{\cos x}{(\tan 2x)^2} \right)'
= \frac{(\sin 2x)^2 \left[(-\sin x)(\cos 2x)^2+\cos x\right]4\cos 2x (-\sin 2x)]
- \cos x \left(\cos 2x\right)^2 4\sin 2x \cos 2x\right)\frac{(-\sin 2x)^2)}{(\tan 2x)^3}\end{align*}
\end{exercise}
\begin{align*}
&= -\frac{\cos(2x) \left[ \sin x \sin 2x \cos 2x + 4 \cos x \right]}{(\sin 2x)^3}.
\end{align*}

Exercise 7.1: Compute the derivative of the following function:

\begin{equation*}
f(x) = \cos((2x^2+3)^3)
\end{equation*}

The derivative is:

\begin{align*}
f'(x) &= \left( \cos((2x^2+3)^3) \right)'
= -\sin((2x^2+3)^3) 3(2x^2+3)^2 \cdot 2x
&= -12x(2x^2+3)^2 \sin((2x^2+3)^3).
\end{align*}

Exercise 7.2: Compute the derivative of the following function:

\begin{equation*}
f(x) = (x^2+1)\sqrt{x^4+1}
\end{equation*}

The derivative is:

\begin{align*}
f'(x) &= \left( (x^2+1)\sqrt{x^4+1} \right)'
= 2x\sqrt{x^4+1} + \frac{2x^3(x^2+1)}{\sqrt{x^4+1}}.
\end{align*}

Exercise 7.3: Compute the derivative of the following function:

\begin{equation*}
f(x) = (\sin(\sin x))^2
\end{equation*}

Exercise 7.4: Compute the derivative of the following function:

\begin{equation*}
f(x) = \sqrt{x^3 - 6x^2 + 2x}
\end{equation*}

Solution on page 103

Solution on page 104
Exercise 7.5: Compute the derivative of the following function:

\[ f(x) = \left( \frac{2 + 3x}{1 - 2x} \right)^3 \]

Solution on page 104

Exercise 7.6: Compute the derivative of the following function:

\[ f(x) = \frac{\cos x}{(\tan 2x)^2} \]

Solution on page 104

Exercise 7.7: Compute the derivative of the following function:

\[ f(x) = \cos((2x^2 + 3)^3) \]

Solution on page 104

Exercise 7.8: Compute the derivative of the following function:

\[ f(x) = (x^2 + 1) \sqrt{x^4 + 1} \]

Solution on page 104

7.4 Example: Solutions

This concludes the example given in Section 7.3 on page 100. Now, the saved and recorded solutions are included.

Solution of Exercise 7.1 on page 102:
The derivative is:

\[ f'(x) = \left( \sin((\sin x)^2) \right)' = \cos((\sin x)^2) \cdot 2 \sin x \cos x. \]

Solution of Exercise 7.3 on page 102:
The derivative is:

\[ f'(x) = \left( \left(\sin(\sin x)\right)^2 \right)' = 2 \sin(\sin x) \cos(\sin x) \cos x. \]
Solution of Exercise 7.4 on page 102:
The derivative is:
\[ f'(x) = \left( \sqrt{x^3 - 6x^2 + 2x} \right)' = \frac{3x^2 - 12x + 2}{2\sqrt{x^3 - 6x^2 + 2x}}. \]

Solution of Exercise 7.5 on page 103:
The derivative is:
\[ f'(x) = \left( \left( \frac{2 + 3x}{1 - 2x} \right)^3 \right)' = 3 \left( \frac{2 + 3x}{1 - 2x} \right)^2 \left( \frac{(1 - 2x)3 - (2 + 3x)(-2)}{(1 - 2x)^2} \right) = \frac{21(2 + 3x)^2}{(1 - 2x)^4}. \]

Solution of Exercise 7.6 on page 103:
The derivative is:
\[ f'(x) = \left( \frac{\cos x}{\tan 2x} \right)' = \left( \frac{\cos x(\cos 2x)^2}{\sin 2x^2} \right)' = \frac{\sin 2x^2[(\sin x)(\cos 2x)^2 + (\cos x)4\cos 2x(-\sin 2x)] - \cos x(\cos 2x)^24\sin 2x \cos 2x}{(\sin 2x)^3}. \]

Solution of Exercise 7.7 on page 103:
The derivative is:
\[ f'(x) = \left( \cos((2x^2 + 3)^3) \right)' = -\sin((2x^2 + 3)^3)3(2x^2 + 3)^22 \cdot 2x = -12x(2x^2 + 3)^2 \sin((2x^2 + 3)^3). \]

Solution of Exercise 7.8 on page 103:
The derivative is:
\[ f'(x) = \left( (x^2 + 1)\sqrt{x^3 + 1} \right)' = 2x\sqrt{x^4 + 1} + \frac{2x^3(x^2 + 1)}{\sqrt{x^4 + 1}}. \]
8 Technical Overview and Customization

This section provides a technical overview of the skin concept of \tcolorbox. For most applications of \tcolorbox, one will not need to know the bells and whistles described herein. You may proceed to Section 9 on page 117 where the customization options for most users are documented.

The following explanations also cover options and settings from the \texttt{skins} library, see Section 9 on page 117.

8.1 Skins and Drawing Engines

From a technical point of view, a \textit{skin} is a style definition for the appearance of a \tcolorbox. The core package provides some additional option keys for skins but only two skins called \texttt{standard} and \texttt{standard jigsaw}. The \texttt{skins} library adds several more skins. To change to a skin, only one option from the core package has to be set.

\begin{verbatim}
\tcbset{colback=Salmon!50!white,colframe=FireBrick!75!black, width=(\linewidth-8mm)/2,before=,after=\hfill,equal height group=ske}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[skin=beamer,beamer,adjusted title=My title]
This is my content.
\end{tcolorbox}
\end{verbatim}

\texttt{/tcb/skin=⟨name⟩} (style, no default, initially \texttt{standard})

Sets the current skin to \langle name\rangle. This is a style definition which sets all the following keys, i.e. for many use cases there is nothing more to do.

\texttt{/tcb/skin first=⟨name⟩} (style, no default, initially \texttt{standard})

If the box is set to be \texttt{/tcb/breakable} and is broken actually, then the skin for the \texttt{first} part of the break sequence is set to \langle name\rangle, see Subsection 15.6 on page 306. Typically, this key is set by a \texttt{/tcb/skin}.

\texttt{/tcb/skin middle=⟨name⟩} (style, no default, initially \texttt{standard})

If the box is set to be \texttt{/tcb/breakable} and is broken actually, then the skin for the \texttt{middle} parts (if any) of the break sequence is set to \langle name\rangle, see Subsection 15.6 on page 306. Typically, this key is set by a \texttt{/tcb/skin}.

\texttt{/tcb/skin last=⟨name⟩} (style, no default, initially \texttt{standard})

If the box is set to be \texttt{/tcb/breakable} and is broken actually, then the skin for the \texttt{last} part of the break sequence is set to \langle name\rangle, see Subsection 15.6 on page 306. Typically, this key is set by a \texttt{/tcb/skin}.

\texttt{/tcb/graphical environment=⟨name⟩} (no default, initially \texttt{pgfpicture})

Sets the graphical environment for the \tcolorbox to \langle name\rangle. Feasible values are \texttt{pgfpicture} and \texttt{tikzpicture} or environments which inherit from one of these two. This key is set by a \texttt{/tcb/skin} and may seldom be used directly.
The skin of a tcolorbox is drawn by up to four engines. Afterwards, the text content is drawn which is not part of a skin. The four steps are:

1. The frame of the box, drawn by /tcb/frame engine.
2. The interior of the box. The interior of a box with title is drawn differently from a box without title. /tcb/interior titled engine or /tcb/interior engine is used to draw the interior.
3. The segmentation (line) of the box, if there is a lower part; drawn by /tcb/segmentation engine.
4. The title area of the box, if there is a title and /tcb/title filled is set to true; drawn by /tcb/title engine.

/tcb/frame engine = ⟨name⟩ (no default, initially standard)
Sets the frame drawing engine for a box to ⟨name⟩. Typically, this key is set by a /tcb/skin. Feasible values for ⟨name⟩ are:
- standard: the original code from the core package,
- path: a tikz path which is controlled by /tcb/frame style,
- pathjigsaw: a tikz path which is controlled by /tcb/frame style,
- pathfirst: a tikz path which is controlled by /tcb/frame style,
- pathfirstjigsaw: a tikz path which is controlled by /tcb/frame style,
- pathmiddle: a tikz path which is controlled by /tcb/frame style,
- pathmiddlejigsaw: a tikz path which is controlled by /tcb/frame style,
- pathlast: a tikz path which is controlled by /tcb/frame style,
- pathlastjigsaw: a tikz path which is controlled by /tcb/frame style,
- freelance: deprecated.
- spartan: a quite spartan code.
- empty: draw nothing.

/tcb/interior titled engine = ⟨name⟩ (no default, initially standard)
Sets the interior drawing engine for a titled box to ⟨name⟩. Typically, this key is set by a /tcb/skin. Feasible values for ⟨name⟩ are:
- standard: the original code from the core package,
- path: a tikz path which is controlled by /tcb/interior style,
- pathfirst: a tikz path which is controlled by /tcb/interior style,
- pathmiddle: a tikz path which is controlled by /tcb/interior style,
- pathlast: a tikz path which is controlled by /tcb/interior style,
- freelance: deprecated.
- spartan: a quite spartan code.
- empty: draw nothing.
/tcb/interior engine=⟨name⟩ (no default, initially standard)
Sets the interior drawing engine for an untitled box to ⟨name⟩. Typically, this key is set by a /tcb/skin. Feasible values for ⟨name⟩ are:
- standard: the original code from the core package,
- path: a tikz path which is controlled by /tcb/interior style,
- pathfirst: a tikz path which is controlled by /tcb/interior style,
- pathmiddle: a tikz path which is controlled by /tcb/interior style,
- pathlast: a tikz path which is controlled by /tcb/interior style,
- freelance: deprecated,
- spartan: a quite spartan code.
- empty: draw nothing.

/tcb/segmentation engine=⟨name⟩ (no default, initially standard)
Sets the segmentation (line) drawing engine for a box to ⟨name⟩. Typically, this key is set by a /tcb/skin. Feasible values for ⟨name⟩ are:
- standard: the original code from the core package,
- path: a tikz path which is controlled by /tcb/segmentation style,
- freelance: deprecated.
- spartan: a quite spartan code.
- empty: draw nothing.

/tcb/title engine=⟨name⟩ (no default, initially standard)
Sets the title area drawing engine for a titled box to ⟨name⟩. Typically, this key is set by a /tcb/skin. Feasible values for ⟨name⟩ are:
- standard: the original code from the core package,
- path: a tikz path which is controlled by /tcb/title style,
- pathfirst: a tikz path which is controlled by /tcb/title style,
- pathmiddle: a tikz path which is controlled by /tcb/title style,
- pathlast: a tikz path which is controlled by /tcb/title style,
- freelance: deprecated.
- spartan: a quite spartan code.
- empty: draw nothing.

After an engine is set to an initializing value, the resulting graphical code can be changed using code option keys, see Section 8.2 on page 109.
If set to `true`, up to four TikZ nodes are defined for a `tcolorbox` which are named `frame`, `interior`, `segmentation`, and `title`. These nodes describe the boundaries of the equally named parts of a `tcolorbox`. They are used by most engines based on TikZ. Typically, this key is set automatically by a `/tcb/skin`.

```latex
\begin{tcolorbox}[adjusted title=The title]
The upper part. \tcblower The lower part.
\end{tcolorbox}
\begin{tcolorbox}[enhanced,adjusted title=The title, frame code={\path[draw=red,fill=red!25] (frame.south west) rectangle (frame.north east);}, interior titled code={\path[draw=blue,fill=blue!25] (interior.south west) rectangle (interior.north east);}, segmentation code={\path[draw=green,fill=green!25] (segmentation.south west) rectangle (segmentation.north east);}, title code={\path[draw=black,fill=brown!75!black] (title.south west) rectangle (title.north east);}]
The upper part. \tcblower The lower part.
\end{tcolorbox}
```
8.2 Code Option Keys

The following code options are applicable for all skins. The used ⟨graphical code⟩ can be any pgf code. For all skins with exception of standard\textsuperscript{P.167} and standard jigsaw\textsuperscript{P.168}, the ⟨graphical code⟩ can also be any TikZ code.

\textbf{/tcb/frame code=⟨graphical code⟩} (code, default from standard)

The given ⟨graphical code⟩ is used for drawing the frame of the box.

\begin{tcolorbox}
\begin{tcbinputlisting}{\begin{tcblisting}[enhanced,frame code={
    \foreach \n in {north east,north west,south east,south west}{
      \path [fill=red!75!black] (interior.\n) circle (3mm);}; ]}
\begin{tcbinputlisting}
\end{tcbinputlisting}
\end{tcbinputlisting}
\end{tcbinputlisting}
\end{tcolorbox}

This is a \textbf{tcolorbox}.

This is the lower part.

\textbf{/tcb/frame empty} (style, no value)

This is a shortcut for setting /tcb/frame code to empty. This option removes the drawing of the frame. Alternatively, use /tcb/frame hidden\textsuperscript{P.118}.

\textbf{/tcb/interior titled code=⟨graphical code⟩} (code, default from standard)

The given ⟨graphical code⟩ is used for drawing the interior of the box, if the box comes with a title.

\begin{tcolorbox}
\begin{tcbinputlisting}{\begin{tcblisting}[enhanced,title=My title,interior titled code={
    \path [draw=red!5!white,line width=5mm,line cap=round]
    ([xshift=3mm,yshift=-3mm]interior.north west)
    --([xshift=-3mm,yshift=3mm]interior.south east)
    ([xshift=3mm,yshift=3mm]interior.south west)
    --([xshift=-3mm,yshift=-3mm]interior.north east);}]
\begin{tcbinputlisting}
\end{tcbinputlisting}
\end{tcbinputlisting}
\end{tcbinputlisting}
\end{tcolorbox}

My title

This is a \textbf{tcolorbox}.

This is the lower part.

\textbf{/tcb/interior titled empty} (style, no value)

This is a shortcut for setting /tcb/interior titled code to empty. This option removes the drawing of the untitled interior. Alternatively, use /tcb/interior hidden\textsuperscript{P.119}.
/tcb/interior code=(graphical code) (code, default from standard)
The given (graphical code) is used for drawing the interior of the box, if the box is without a title.

\begin{tcolorbox}
\[enhanced,interior code={\path[draw=red!5!white,line width=5mm,line cap=round]
([xshift=3mm,yshift=-3mm]interior.north west)
--([xshift=-3mm,yshift=3mm]interior.south east)
([xshift=3mm,yshift=3mm]interior.south west)
--([xshift=-3mm,yshift=-3mm]interior.north east);}]
\end{tcolorbox}

My title

\begin{tcolorbox}[enhanced,title=My title,segmentation code={\path[top color=red!5!white,bottom color=red!5!white,middle color=blue]
(\textbf{segmentation}.south west) rectangle (\textbf{segmentation}.north east);}]
\end{tcolorbox}

/tcb/interior empty (style, no value)
This is a shortcut for setting /tcb/interior code to empty. This option removes the drawing of the interior. Alternatively, use /tcb/interior hidden \textsuperscript{P.119}.

/tcb/segmentation code=(graphical code) (code, default from standard)
The given (graphical code) is used for drawing the segmentation area of the box.

\begin{tcolorbox}[enhanced,title=My title,segmentation code={\path[draw=red!5!white,line width=5mm,line cap=round]
([xshift=3mm,yshift=-3mm]segmentation.north west)
--([xshift=-3mm,yshift=3mm]segmentation.south east)
([xshift=3mm,yshift=3mm]segmentation.south west)
--([xshift=-3mm,yshift=-3mm]segmentation.north east);}]
\end{tcolorbox}

/tcb/segmentation empty (style, no value)
This is a shortcut for setting /tcb/segmentation code to empty. This option removes the drawing of the segmentation line. Alternatively, use /tcb/segmentation hidden \textsuperscript{P.120}.

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/tcb/title\ code\ =\ ⟨graphical\ code⟩ \quad \text{(code, \ default\ from\ standard)}\]

The given ⟨graphical code⟩ is used for drawing the title area of the box.

\[\begin{tcolorbox}
\[\text{My title}\]
\[\text{This is a tcolorbox.}\]
\[\text{This is the lower part.}\]
\end{tcolorbox}\]

/tcb/title\ empty \quad \text{(style, \ no\ value)}

This is a shortcut for setting /tcb/title\ code to empty. This option removes the drawing of the title area. Alternatively, use /tcb/title\ hidden \text{P.121}.
8.3 Subskins

A subskin is a new /tcb/skin based on an existing skin which is extended or changed.

Never use geometry settings or bounding box options inside a subskin definition! If one skin is replaced by another skin, the overall bounding box should stay constant. Especially, if a skin is used for a breakable box, unpredictable and unpleasant results could arise otherwise. If you want to change the geometry also, use an additional style. See the skin beamer and the style /tcb/beamer as pattern.

\tcbsubskin{(name)}{(base skin)}{(options)}

Creates a new skin (name) which inherits all properties of an existing (base skin) plus the given (options). The new skin (name) can be used as value for the keys /tcb/skin, /tcb/skin first, /tcb/skin middle, and /tcb/skin last. As (base skin), one can take standard, empty, enhanced, or any skin from the skins library, see Section 9 on page 117.

% \tcbuselibrary{skins}
\tcbsubskin{mycross}{empty}{frame code={
    \draw[red,line width=5pt] (frame.south west)--(frame.north east);
    \draw[red,line width=5pt] (frame.north west)--(frame.south east);
    skin first=mycross,skin middle=mycross,skin last=mycross }
\begin{tcolorbox}[skin=mycross]
This is my content.
\end{tcolorbox}

/\tcb/skin first is subskin of={(base skin)}{(options)} (no default, initially unset)

Creates a new unnamed skin which inherits all properties of an existing (base skin) plus the given (options). This skin is set as /tcb/skin first. See a detailed example on page 201.

/\tcb/skin middle is subskin of={(base skin)}{(options)} (no default, initially unset)

Creates a new unnamed skin which inherits all properties of an existing (base skin) plus the given (options). This skin is set as /tcb/skin middle. See a detailed example on page 201.

/\tcb/skin last is subskin of={(base skin)}{(options)} (no default, initially unset)

Creates a new unnamed skin which inherits all properties of an existing (base skin) plus the given (options). This skin is set as /tcb/skin last. See a detailed example on page 201.
8.4 Drawing Scheme

Depending on the complexity of a \texttt{tcolorbox} definition, the resulting box is drawn in a more or less complex series of steps.

To document and demonstrate these drawing steps, we consider the following box definition:

\begin{tcolorbox}[enhanced,title=Test Box, boxrule=1mm,titlerule=0.5mm,colframe=blue!50!black, interior style={top color=blue!20!green!50!white,bottom color=blue!20!yellow!50!white}, colbacktitle=blue!50!green!90!white,segmentation style={solid}, fonttitle=\textbf,drop fuzzy shadow,borderline={0.3mm}{0.35mm}{yellow!50!white}, underlay={\path[fill image opacity=0.15,fill image scale=0.9, fill stretch picture={\draw[blue,line width=2mm] circle (1);}] (interior.south west) rectangle (interior.north east);}, watermark text={Watermark},watermark color={green!20!white}, finish={\begin{tcbclipframe}
\path[bottom color=black,top color=black!50!white,opacity=0.1] (frame.south west) -- (frame.south east) -- (frame.north east) -- cycle;
\path[top color=white,bottom color=black!50!white,opacity=0.1] (frame.south west) -- (frame.north east) -- (frame.north west) -- cycle;
\end{tcbclipframe}}]
\end{tcolorbox}

For this definition, we get the maximal number of drawing steps:

1. shadow

- Section 9.6 on page 148.

2. frame

- /tcb/colframe\textsuperscript{P.25}, /tcb/opacityframe\textsuperscript{P.43}
- /tcb/frame code\textsuperscript{P.109}
- /tcb/frame style\textsuperscript{P.117}
Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi.


- Section 9.5 on page 143
- Section 9.2 on page 124
- Section 9.8 on page 160
- Section 4.11 on page 61
- Section 9.3 on page 131

Lower part

• /tcb/colupper P.26, /tcb/collower P.26, /tcb/coltitle P.26
• /tcb/fontupper P.27, /tcb/fontlower P.27, /tcb/fonttitle P.27
• /tcb/opacityupper P.44, /tcb/opacitylower P.44, /tcb/opacitytitle P.44

All together, the box is drawn:

\begin{testbox}
\lipsum[2]
\tcblower
\end{testbox}
9 Library \skins

The library is loaded by a package option or inside the preamble by:

```latex
\tcbuselibrary{skins}
```

This also loads the package tikz [20]. Typically but not necessarily, the following skins use tikz instead of pgf.

9.1 Style Option Keys

The following style options are applicable for all skins which use engines of type \path, \pathfirst, \pathmiddle, or \patlhast. Especially, the skin enhanced \[P.169\] supports all of them and standard \[P.167\] none.

\tcb/frame style\{tikz keys\} \hspace{1em} (style, no default)

The \{tikz keys\} are used inside the tikz path command for drawing the frame of the box. This option is available if the \tcb/frame engine \[P.106\] is set to \path, \pathfirst, \pathmiddle, or \patlhast. It is not available for standard.

\begin{tcolorbox}[enhanced,title=My title, frame style={left color=red!75!black, right color=blue!75!black}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

\tcbset{colback=red!5!white,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title, frame style={left color=red!75!black, right color=blue!75!black}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title

\begin{tcolorbox}[enhanced,title=My title, frame style image=blueshade.png]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

\tcbset{colback=red!5!white,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title, frame style image=blueshade.png]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title

/fcb/frame style image\{file name\} \hspace{1em} (no default, initially unset)

Fills the frame with an external image referenced by \{file name\}. For advanced features like blending of a picture with the background, use /tcb/frame style together with /tikz/fill stretch image \[P.214\].

\begin{tcolorbox}[enhanced,title=My title, frame style image=blueshade.png]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title

\begin{tcolorbox}[enhanced,title=My title, frame style image=blueshade.png]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
/tcb/frame style tile={(graphics options)}{(file name)} (no default, initially unset)
Fills the frame with a tile pattern based on an external image referenced by ⟨file name⟩. The ⟨graphics options⟩ are given to the underlying \includegraphics command. For advanced features like blending of a picture with the background, use /tcb/frame style together with /tikz/fill tile image.

```
\begin{tcolorbox}[enhanced,title=My title,
  frame style tile={width=1cm}{pink_marble.png}]
This is a tcolorbox.
\tcblower
This is the lower part.
\end{tcolorbox}
```

/my title
This is a tcolorbox.
This is the lower part.

/tcb/frame hidden (style, no value)
This is a shortcut for frame style={draw=none,fill=none}. Depending on the skin, this option switches off the drawing of the frame. Alternatively, use /tcb/frame empty.

```
\begin{tcolorbox}[enhanced,title=My title,
  frame hidden]
This is a tcolorbox.
\tcblower
This is the lower part.
\end{tcolorbox}
```

/my title
This is a tcolorbox.
This is the lower part.

/tcb/interior style=(tikz keys) (style, no default)
The ⟨tikz keys⟩ are used inside the tikz path command for drawing the interior of the box. They are used for the titled and for the untitled version as well. This option is available if the /tcb/interior titled engine or /tcb/interior engine is set to path, pathfirst, pathmiddle, or pathlast. It is not available for standard.

```
\begin{tcolorbox}[enhanced,title=My title,
  interior style={left color=red!20!white,
   right color=yellow!50!white}]
This is a tcolorbox.
\tcblower
This is the lower part.
\end{tcolorbox}
```

/my title
This is a tcolorbox.
This is the lower part.
/tcb/interior style image=⟨file name⟩
(no default, initially unset)
Fills the interior with an external image referenced by ⟨file name⟩. For advanced features like blending of a picture with the background, use /tcb/interior style\textsuperscript{P.118} together with /tikz/fill stretch image\textsuperscript{P.214}.

\begin{tcolorbox}[enhanced,title=My title,interior style image=goldshade.png]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title
This is a \textbf{tcolorbox}.
This is the lower part.

/tcb/interior style tile=\{(graphics options)\}{⟨file name⟩}
(no default, initially unset)
Fills the interior with a tile pattern based on an external image referenced by ⟨file name⟩. The ⟨graphics options⟩ are given to the underlying \texttt{\includegraphics} command. For advanced features like blending of a picture with the background, use /tcb/interior style\textsuperscript{P.118} together with /tikz/fill tile image\textsuperscript{P.218}.

\begin{tcolorbox}[enhanced,title=My title,interior style tile={width=2cm}{crinklepaper.png}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title
This is a \textbf{tcolorbox}.
This is the lower part.

/tcb/interior hidden
(style, no value)
This is a shortcut for interior style=\{draw=none,fill=none\}. Depending on the skin, this option switches off the drawing of the interior. Alternatively, use /tcb/interior empty\textsuperscript{P.110} and/or /tcb/interior titled empty\textsuperscript{P.109}.

\begin{tcolorbox}[enhanced,title=My title,interior hidden]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title
This is a \textbf{tcolorbox}.
This is the lower part.
/tcb/segmentation style=(tikz keys)  (style, no default)
The (tikz keys) are used inside the tikz path command for drawing the segmentation line of the box.
This option is available if the /tcb/segmentation engine \(^{P.107}\) is set to path. It is not available for standard.

```
\begin{tcolorbox}[enhanced,title=My title, segmentation style={double=white,draw=blue, double distance=1pt,solid}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

My title
This is a \textbf{tcolorbox}.
This is the lower part.

/tcb/segmentation hidden  (style, no value)
This is a shortcut for segmentation style={draw=none,fill=none}. Depending on the skin, this option switches off the drawing of the segmentation line. See also /tcb/lower separated \(^{P.23}\) which has the same effect for most skins. Alternatively, use /tcb/segmentation empty \(^{P.110}\).

```
\begin{tcolorbox}[enhanced,segmentation hidden]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

My title
This is a \textbf{tcolorbox}.
This is the lower part.

/tcb/title style=(tikz keys)  (style, no default)
The (tikz keys) are used inside the tikz path command for drawing the title area of the box.
This option is available if the /tcb/title engine \(^{P.107}\) is set to path, pathfirst, pathmiddle, or pathlast. It is not available for standard.

```
\begin{tcolorbox}[enhanced,title=My title, title style={left color=blue!15!yellow, right color=red!85!black}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

My title
This is a \textbf{tcolorbox}.
This is the lower part.
/tcb/title style image\textit{(file name)}
(no default, initially unset)
Fills the title area with an external image referenced by \textit{(file name)}. For advanced features like blending of a picture with the background, use /tcb/title style \textsuperscript{P.120} together with /tikz/fill stretch image \textsuperscript{P.214}.

\begin{tcolorbox}[enhanced,title=My title,\
title style image=blueshade.png]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title
This is a \textbf{tcolorbox}.
This is the lower part.

/tcb/title style tile\textit{⟨graphics options⟩}{⟨file name⟩}
(no default, initially unset)
Fills the title area with a tile pattern based on an external image referenced by \textit{⟨file name⟩}. The \textit{⟨graphics options⟩} are given to the underlying \texttt{\textbackslash includegraphics} command. For advanced features like blending of a picture with the background, use /tcb/title style \textsuperscript{P.120} together with /tikz/fill tile image \textsuperscript{P.218}.

\begin{tcolorbox}[enhanced,title=My title,\
title style tile={width=1cm}{pink_marble.png}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title
This is a \textbf{tcolorbox}.
This is the lower part.

/tcb/title hidden
(style, no value)
This is a shortcut for title style\textit{⟨draw=none,fill=none⟩}. Depending on the skin, this option switches off the drawing of the title background. See also /tcb/title filled \textsuperscript{P.25} for a similar effect. Alternatively, use /tcb/title empty \textsuperscript{P.111}.

\begin{tcolorbox}[enhanced,title=My title,\
title hidden]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}

My title
This is a \textbf{tcolorbox}.
This is the lower part.
The ⟨tikz keys⟩ are used to draw a title rule, i.e. a rule below the optional title. The width of the rule is controlled by /tcb/titlerule."P.30. It may be set directly to a smaller width to create mixed effects with the standard rule. This option is implemented as an /tcb/underlay."P.160. Thus, it is not available for standard."P.167 and standard jigsaw."P.168, but for all other skins, e.g. enhanced."P.169. As an underlay, this option can be used multiple times and is removed by /tcb/no underlay."P.160.

\begin{tcolorbox}[enhanced, colback=red!5!white,colframe=red!75!black, colbacktitle=red!50!yellow,fonttitle=\bfseries, title=My title, titlerule=1mm, titlerule style=yellow ]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[enhanced, colback=red!5!white,colframe=red!75!black, colbacktitle=red!50!yellow,fonttitle=\bfseries, title=My title, titlerule=1mm, titlerule style={yellow,line width=0.5mm} ]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[enhanced, colback=red!10!white,colframe=red!75!black, colbacktitle=red!50!yellow,fonttitle=\bfseries, frame hidden, title=My title, boxrule=0pt,titlerule=1mm, titlerule style=red!50!black ]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[empty, coltitle=red!75!black,fonttitle=\bfseries, borderline horizontal={0.5mm}{0pt}{red!50!white}, title=My title, titlerule style={red, arrows = {Hooks[arc=270]-Hooks[arc=270]}} ]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
The combined Ti\kZ style applied to frame, interior, and title background can be used by authors in customizing code.

/tikz/tcb fill frame (style, no value)
This is a Ti\kZ style which is finally applied to the frame of the box.

\begin{tcolorbox}[title=My title]
This is a tcolorbox.
\tcblower
This is the lower part.
\end{tcolorbox}

/tikz/tcb fill interior (style, no value)
This is a Ti\kZ style which is finally applied to the interior of the box.

\begin{tcolorbox}[title=My title]
This is a tcolorbox.
\tcblower
This is the lower part.
\end{tcolorbox}

/tikz/tcb fill title (style, no value)
This is a Ti\kZ style which is finally applied to the title area of the box.

\begin{tcolorbox}[title=My title]
This is a tcolorbox.
\tcblower
This is the lower part.
\end{tcolorbox}
9.2 Boxed Title Option Keys

The following options place the title text into an own \tcbox. This boxed title can be customized independently from the main box using /tcb/boxed title style. The placement can be influenced by \{boxtitle options\}.

\texttt{/tcb/attach boxed title to top left=\{boxtitle options\} (style, default empty)}
The title is boxed with a \tcbox and attached to the top left corner of the main box.

\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top left]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\texttt{/tcb/attach boxed title to top center=\{boxtitle options\} (style, default empty)}
The title is boxed with a \tcbox and attached to the top of the main box.

\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top center]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\texttt{/tcb/attach boxed title to top right=\{boxtitle options\} (style, default empty)}
The title is boxed with a \tcbox and attached to the top right corner of the main box.

\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top right]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\texttt{/tcb/attach boxed title to bottom left=\{boxtitle options\} (style, default empty)}
The title is boxed with a \tcbox and attached to the bottom left corner of the main box.

\begin{tcolorbox}[enhanced,title=My title, attach boxed title to bottom left]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\texttt{/tcb/attach boxed title to bottom center=\{boxtitle options\} (style, default empty)}
The title is boxed with a \tcbox and attached to the bottom of the main box.

\begin{tcolorbox}[enhanced,title=My title, attach boxed title to bottom center]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\texttt{/tcb/attach boxed title to bottom right=\{boxtitle options\} (style, default empty)}
The title is boxed with a \tcbox and attached to the bottom right corner of the main box.

\begin{tcolorbox}[enhanced,title=My title, attach boxed title to bottom right]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
The \textit{boxed title options} of the keys described above are shift values. The dimensions of the boxed title are stored into two macros \texttt{tcboxedtitleheight} and \texttt{tcboxedtitlewidth}. These macros can be used inside the following \textit{boxed title options}:

\begin{verbatim}
/tcb/boxtitle/xshift=  \hspace{2cm}  \texttt{\langle length \rangle}  \text{(no default, initially 0pt)}
\end{verbatim}

The boxed title is shifted by \texttt{\langle length \rangle} in the horizontal direction.

\begin{verbatim}
\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top left=\langle xshift=-2mm \rangle, boxed title style=\langle size=small, colback=blue \rangle]
This is a \texttt{\textbf{tcolorbox}}.
\end{tcolorbox}
\end{verbatim}

\begin{verbatim}
\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top left=\langle xshift=-2mm \rangle, boxed title style=\langle size=small, colback=blue \rangle]
This is a \texttt{\textbf{tcolorbox}}.
\end{tcolorbox}
\end{verbatim}

\begin{verbatim}
/tcb/boxtitle/yshift= \hspace{2cm}  \texttt{\langle length \rangle}  \text{(no default, initially 0pt)}
\end{verbatim}

The boxed title is shifted by \texttt{\langle length \rangle} in the vertical direction.

\begin{verbatim}
\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top center=\langle yshift=-\texttt{tcboxedtitleheight}/2 \rangle, boxed title style=\langle size=small, colback=blue \rangle]
This is a \texttt{\textbf{tcolorbox}}.
\end{tcolorbox}
\end{verbatim}

\begin{verbatim}
\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top center=\langle yshift=-\texttt{tcboxedtitleheight}/2 \rangle, boxed title style=\langle size=small, colback=blue \rangle]
This is a \texttt{\textbf{tcolorbox}}.
\end{tcolorbox}
\end{verbatim}

\begin{verbatim}
/tcb/boxtitle/yshifttext= \hspace{2cm}  \texttt{\langle length \rangle}  \text{(no default, initially 0pt)}
\end{verbatim}

The text inside the main box by \texttt{\langle length \rangle} to give room for e.g. a sunken title.

\begin{verbatim}
\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top center=\langle yshift=-3mm,yshifttext=-1mm \rangle, boxed title style=\langle size=small, colback=blue \rangle]
This is a \texttt{\textbf{tcolorbox}}.
\end{tcolorbox}
\end{verbatim}

\begin{verbatim}
\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top center=\langle yshift=-3mm,yshifttext=-1mm \rangle, boxed title style=\langle size=small, colback=blue \rangle]
This is a \texttt{\textbf{tcolorbox}}.
\end{tcolorbox}
\end{verbatim}

\begin{verbatim}
/tcb/boxtitle/yshift*= \hspace{2cm}  \texttt{\langle length \rangle}  \text{(no default, initially 0pt)}
\end{verbatim}

Sets \texttt{/tcb/boxtitle/yshift} and \texttt{/tcb/boxtitle/yshifttext} the same time. \texttt{/tcb/boxtitle/yshifttext} is only set if necessary.

\begin{verbatim}
\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top center=\langle yshift*=3mm \rangle, boxed title style=\langle size=small, colback=blue \rangle]
This is a \texttt{\textbf{tcolorbox}}.
\end{tcolorbox}
\end{verbatim}

\begin{verbatim}
\begin{tcolorbox}[enhanced,title=My title, attach boxed title to top center=\langle yshift*=3mm \rangle, boxed title style=\langle size=small, colback=blue \rangle]
This is a \texttt{\textbf{tcolorbox}}.
\end{tcolorbox}
\end{verbatim}

The bounding box of the resulting \texttt{tcolorbox} is adapted automatically to the \textit{vertical} dimensions of the boxed title. Possible horizontal enlargements are \textit{not} automatically computed.
The boxed title options are implemented as an underlay, see Section 9.8 on page 160. Therefore, a boxed title is not drawn, if a skin does not support underlays like standard \textsuperscript{P.167}. Still, the room for the boxed titles gets reserved in these cases.

A Ti\textit{kZ} node \textit{title} is produced by a boxed title which can be used inside /tcb/frame code\textsuperscript{P.109}, /tcb/interior code\textsuperscript{P.110}, underlays, overlays, and finishes.

A boxed title is almost always the first underlay. The only exceptions are underlays defined by /tcb/underlay boxed title\textsuperscript{P.161} which are drawn before. Additionally, underlays defined by /tcb/underlay boxed title\textsuperscript{P.161} are only drawn, if a boxed title is actually set. They are ignored, if there is no boxed title.

\texttt{/tcb/boxed title style=\{options\}} \textsuperscript{(style, initially empty)}

By default, a boxed title is dimensioned with /tcb/size\textsuperscript{P.36}=\textit{title} and inherits /tcb/colframe\textsuperscript{P.25} of the main box. Also, the /tcb/colback\textsuperscript{P.25} is inherited from the main /tcb/colbacktitle\textsuperscript{P.25}. Font and color of the title text are set as usual. All other \textit{\textless options\textgreater} are set by the boxed title style key. Since a boxed title is set by \texttt{\textbackslash tcbox}\textsuperscript{P.13}, all \texttt{tcolorbox} options are applicable here.

\begin{tcolorbox}[enhanced,title=My title, fonttitle=\bfseries,coltitle=green!25!black, attach boxed title to top center=\{yshift=-2mm,yshifttext=-1mm\}, boxed title style=\{colframe=green!75!black, colback=yellow!50!green\}]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[enhanced,title=My title, colframe=red!50!black,colback=red!10!white, arc=1mm,colbacktitle=red!10!white, fonttitle=\bfseries,coltitle=red!50!black, attach boxed title to top left=\{xshift=3.2mm,yshift=-0.50mm\}, boxed title style=\{enhanced, skin=enhancedfirst jigsaw, size=small,arc=1mm,bottom=-1mm, interior style=\{top color=red!30!white, bottom color=red!20!white\}\}]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

The title text content is captured with a horizontal box. Especially, there are no linebreak possible.

\newtcolorbox{mybox}[1]{hbox boxed title, enhanced,attach boxed title to top center= {yshift=-3mm,xshifttext=-1mm}, boxed title style={size=small, colback=red}, title={#1}}
\begin{mybox}{Short title}
This is a \textbf{tcolorbox}.
\end{mybox}
\bigskip
\begin{mybox}{This title is not really very short}
This is a \textbf{tcolorbox}.
\end{mybox}

The title text content is captured with a minipage with a width of \langle length \rangle. By default, the resulting boxed title is somewhat smaller than the main box.

\newtcolorbox{mybox}[1]{minipage boxed title, enhanced,attach boxed title to top center= {yshift=-3mm,xshifttext=-1mm}, boxed title style={size=small, colback=red}, center title, title={#1}}
\begin{mybox}{Short title}
This is a \textbf{tcolorbox}.
\end{mybox}
\bigskip
\begin{mybox}{This title is not really very short}
This is a \textbf{tcolorbox}.
\end{mybox}

The title text content is captured with a minipage with a width of main box width plus \langle length \rangle. By default, the resulting boxed title is somewhat smaller than the main box.

\newtcolorbox{mybox}[1]{minipage boxed title*=2cm, enhanced,attach boxed title to top center= {yshift=-3mm,xshifttext=-1mm}, boxed title style={size=small, colback=red}, center title, title={#1}}
\begin{mybox}{Short title}
This is a \textbf{tcolorbox}.
\end{mybox}
\bigskip
\begin{mybox}{This title is not really very short}
This is a \textbf{tcolorbox}.
\end{mybox}
The title text content is captured with a TikZ node with given TikZ \texttt{(options)}. The text is centered by default.

\begin{mybox}{Short title}
This is a \textbf{tcolorbox}.
\end{mybox}
\begin{mybox}{This title is not really very short}
This is a \textbf{tcolorbox}.
\end{mybox}

The title text content is captured with a \texttt{varwidth} environment with a width of \texttt{(length)}. This style needs the \texttt{varwidth} package \cite{varwidth} to be loaded manually. By default, the resulting boxed title is somewhat smaller than the main box.

\begin{mybox}{Short title}
This is a \textbf{tcolorbox}.
\end{mybox}
\begin{mybox}{This title is not really very short}
This is a \textbf{tcolorbox}.
\end{mybox}

The title text content is captured with a \texttt{varwidth} environment with a width of main box width plus \texttt{(length)}. This style needs the \texttt{varwidth} package \cite{varwidth} to be loaded manually. By default, the resulting boxed title is somewhat smaller than the main box.

\begin{mybox}{Short title}
This is a \textbf{tcolorbox}.
\end{mybox}
\begin{mybox}{This title is not really very short}
This is a \textbf{tcolorbox}.
\end{mybox}
9.3 Watermark Option Keys

The following watermark options are applicable for all skins which use \texttt{tikzpicture} as \texttt{/tcb/graphical environment} \textsuperscript{P.105}. Therefore, the skin \texttt{standard} \textsuperscript{P.167} does not support these watermarks, but all other skins, e.g. \texttt{enhanced} \textsuperscript{P.169}.

The watermark options rely on the more general overlay options described in Section 4.11 from page 61. Therefore, \texttt{watermarks} and \texttt{overlays} cannot be used mixed. But a mixture is possible with the \texttt{hooks} library, see Section 17.

\texttt{/tcb/watermark text=⟨text⟩} (no default, initially unset)

Writers some ⟨text⟩ in the center of the interior region of a \texttt{tcolorbox}. This ⟨text⟩ is written \textit{after} the frame and interior are drawn and \textit{before} the text content is drawn. It is zoomed or stretched according the values of \texttt{/tcb/watermark zoom} \textsuperscript{P.134} or \texttt{/tcb/watermark stretch} \textsuperscript{P.136}.

\begin{tcolorbox}[enhanced,title=My title,watermark text=My Watermark]
\lipsum[1]
\tcblower
\lipsum[2]
\end{tcolorbox}

\texttt{/tcb/watermark text on=⟨part⟩ is ⟨text⟩} (no default, initially unset)

This option writes some ⟨text⟩ in the center of the interior region of a \texttt{tcolorbox} as described for \texttt{/tcb/watermark text}. But this is done only for boxes named ⟨part⟩ of a break sequence, see \texttt{/tcb/breakable} \textsuperscript{P.297}.

Feasible values for ⟨part⟩ are:

- \texttt{broken}: all broken box parts,
- \texttt{unbroken}: unbroken boxes only,
- \texttt{first}: first parts of a break sequence,
- \texttt{middle}: middle parts of a break sequence,
- \texttt{last}: last parts of a break sequence,
- \texttt{unbroken and first}: unbroken boxes and first parts of a break sequence,
- \texttt{middle and last}: middle and last parts of a break sequence,
- \texttt{first and middle}: first and middle parts of a break sequence.

My title


\begin{tcolorbox}[enhanced,title=My title,watermark graphics=Basilica_5.png,watermark opacity=0.15]
\lipsum[1-2]
\tcblower
\end{tcolorbox}

My title

This example uses a public domain picture from
http://commons.wikimedia.org/wiki/File:Basilica_5.png

\begin{tcolorbox}[enhanced,title=My title,watermark graphics=Basilica_5.png,watermark opacity=0.15]
\lipsum[1-2]
\tcblower
\end{tcolorbox}

This example uses a public domain picture from
http://commons.wikimedia.org/wiki/File:Basilica_5.png

/tcb/watermark graphics=(file name)  \hspace{0.5cm} (no default, initially unset)
Draws an external picture referenced by (file name) in the center of the interior region of a tcolorbox. The picture is drawn after the frame and interior are drawn and before the text content is drawn. It is zoomed or stretched according the values of /tcb/watermark zoom \cite{P.134} or /tcb/watermark stretch \cite{P.136}.

\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}
\begin{tcolorbox}[enhanced,title=My title,watermark graphics=Basilica_5.png,watermark opacity=0.15]
\lipsum[1-2]
\tcblower
This example uses a public domain picture from\http://commons.wikimedia.org/wiki/File:Basilica_5.png
\end{tcolorbox}

/tcb/watermark graphics on=(part) is (file name) \hspace{0.5cm} (no default, initially unset)
This option draws a picture referenced by (file name) in the center of the interior region of a tcolorbox as described for /tcb/watermark graphics. But this is done only for boxes named (part) of a break sequence, see /tcb/breakable \cite{P.297}.
Feasible values for (part) are:
- broken: all broken box parts,
- unbroken: unbroken boxes only,
- first: first parts of a break sequence,
- middle: middle parts of a break sequence,
- last: last parts of a break sequence,
- unbroken and first: unbroken boxes and first parts of a break sequence,
- middle and last: middle and last parts of a break sequence.
/tcb/watermark tikz=⟨graphical code⟩

(no default, initially unset)

Draws the given \texttt{tikz} \texttt{(graphical code)} in the center of the interior region of a \texttt{tcolorbox}. The code is executed \textit{after} the frame and interior are drawn and \textit{before} the text content is drawn. The result is zoomed or stretched according the values of /tcb/watermark zoom \textsuperscript{P.134} or /tcb/watermark stretch \textsuperscript{P.136}.

\begin{tcolorbox}
\set{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}
\begin{code}
\begin{tcolorbox}[enhanced,title=My title, watermark tikz={\draw[line width=2mm] circle (1cm) node\texttt{(fontfamily{ptm}\fontseries{b}\fontsize{20mm}{20mm}\selectfont ?);}}]
\lipsum[1]
\lipsum[2]
\end{tcolorbox}
\end{code}
\end{tcolorbox}

/\texttt{tcb/watermark tikz on}=⟨part⟩ is ⟨graphical code⟩

(no default, initially unset)

This option draws the given \texttt{tikz} \texttt{(graphical code)} in the center of the interior region of a \texttt{tcolorbox} as described for /tcb/watermark tikz. But this is done only for boxes named ⟨\texttt{part}⟩ of a break sequence, see /tcb/breakable \textsuperscript{P.297}.

Feasible values for ⟨\texttt{part}⟩ are:

• \texttt{broken}: all broken box parts,
• \texttt{unbroken}: unbroken boxes only,
• \texttt{first}: first parts of a break sequence,
• \texttt{middle}: middle parts of a break sequence,
• \texttt{last}: last parts of a break sequence,
• \texttt{unbroken and first}: unbroken boxes and first parts of a break sequence,
• \texttt{middle and last}: middle and last parts of a break sequence.

/tcb/no watermark

(style, no default, initially set)

Removes the watermark if set before. This is an alias for /tcb/no overlay \textsuperscript{P.62}. 

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Sets the opacity value $\in [0,1]$ for a watermark.

```
\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries, watermark text=Watermark,nobeforeafter,width=(\linewidth-2mm)/2}
\begin{tcolorbox}[title=Opacity 1.00,watermark opacity=1.00]
\lipsum[2]
\end{tcolorbox}\hfill
\begin{tcolorbox}
\lipsum[2]
\end{tcolorbox}
```

```
\begin{tcolorbox}[title=Opacity 0.50,watermark opacity=0.50]
\lipsum[2]
\end{tcolorbox}
```

```
\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries, watermark text=Watermark,nobeforeafter,width=(\linewidth-2mm)/2}
\begin{tcolorbox}[title=Zoom 1.0,watermark zoom=1.0]
\lipsum[2]
\end{tcolorbox}\hfill
\begin{tcolorbox}
\lipsum[2]
\end{tcolorbox}
```

```
\begin{tcolorbox}[title=Zoom 0.5,watermark zoom=0.5]
\lipsum[2]
\end{tcolorbox}
```

Sets the zoom value for a watermark. The zoom respects the aspect ratio. The value 1.0 means to fill the whole box until the watermark touches the frame.

```
\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries, watermark text=Watermark,nobeforeafter,width=(\linewidth-2mm)/2}
\begin{tcolorbox}[title=Zoom 1.0,watermark zoom=1.0]
\lipsum[2]
\end{tcolorbox}\hfill
\begin{tcolorbox}
\lipsum[2]
\end{tcolorbox}
```

```
\begin{tcolorbox}[title=Zoom 0.5,watermark zoom=0.5]
\lipsum[2]
\end{tcolorbox}
```
/tcb/watermark shrink = (fraction)  
(no default, initially unset)

Identically to /tcb/watermark zoom, but the watermark never gets enlarged. Thus, the watermark keeps its original size or is shrunk.

/tcb/watermark overzoom = (fraction)  
(no default, initially unset)

Sets the overzoom value for a watermark. The overzoom respects the aspect ratio. The value 1.0 means to fill the whole box until the watermark touches all four sides of the frame.

\tcbset{enhanced, colback=white, colframe=blue!50!black, fonttitle=\bfseries, watermark opacity=0.5, watermark graphics=lichtspiel.jpg, nobeforeafter, width=(\linewidth-2mm)/2}

\begin{tcolorbox}\[title=Zoom 1.0, watermark zoom=1.0\]
\lipsum[1]
\end{tcolorbox}
\begin{tcolorbox}\[title=Overzoom 1.0, watermark overzoom=1.0\]
\lipsum[1]
\end{tcolorbox}

If a /tcb/watermark overzoom value of 1.0 is used in connection with invisible top and bottom rules which still have a thickness greater than 0pt, the space of these invisible rules may not be covered by the watermark. For example, this situation may occur during the breaking of /tcb/enhanced boxes. To avoid this optical glitch, just set /tcb/pad at break to any desired value.
/tcb/watermark stretch=\langle fraction\rangle 
(no default, initially unset)
Sets the stretch value for a watermark. The stretch value is applied to width and height in relation to the box dimensions. It does not respect the aspect ratio. The value 1.0 means to fill the whole box.

\begin{tcolorbox}[enhanced,title=Stretch 1.00,watermark stretch=1.00]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[enhanced,title=Stretch 0.50,watermark stretch=0.50]
\lipsum[2]
\end{tcolorbox}

/tcb/watermark color=\langle color\rangle 
(no default, initially mixed background and frame color)
Sets the color for the watermark.

\begin{tcolorbox}[colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries]
\begin{tcolorbox}[enhanced,title=My title,watermark text=My Watermark,watermark color=yellow!50!red]
\lipsum[1]
\end{tcolorbox}
\end{tcolorbox}
Sets the watermark to be clipped to the interior area.

\[\textsf{\texttt{\textbackslash tcbset\{enhanced,\textbackslash colback=white,\textbackslash colframe=blue!50!white,\textbackslash fonttitle=\textbackslash bfseries,\textbackslash watermark opacity=0.5,\textbackslash watermark stretch=1.00,\textbackslash arc=3mm,\textbackslash watermark graphics=lichtspiel.jpg\}}}\]

\begin{tcolorbox}[title=Clip (default),\textbackslash clip watermark]\begin{lipsum}[1]\end{lipsum}\end{tcolorbox}

\begin{tcolorbox}[title=No clip,\textbackslash clip watermark=false]\begin{lipsum}[1]\end{lipsum}\end{tcolorbox}
9.4 Clip Environments

The following clip environments are applicable for all skins which use engines of type `path`, `pathfirst`, `pathmiddle`, or `pathlast`. Especially, the skin `enhanced` supports all of them and `standard` none. The typical area of application is inside overlay code, see Section 4.11 from page 61.

\begin{tcbclipframe}
\begin{environment content}
\end{environment content}
\end{tcbclipframe}

Defines a Tikz scope which clips to the frame area path.

\begin{picturebox}[title=My Picture Box]{lichtspiel.jpg}
\lipsum[1]
\end{picturebox}

My Picture Box

\begin{tcbinvclipframe}
\begin{environment content}
\end{environment content}
\end{tcbinvclipframe}

Defines a Tikz scope which clips to the outside of the frame area path.

\tcset{enhanced jigsaw,fonttitle=\bfseries,opacityback=0.35,colback=blue!5!white, frame style={left color=red!75!black,right color=red!10!yellow}}

\begin{tikzpicture}
\path[use as bounding box] (0,0.8) rectangle +(0.1,0.1);
\shadedraw [shading=ball] (0,0) circle (1cm);
\shadedraw [ball color=red] (3,-2.2) circle (1cm);
\end{tikzpicture}

\begin{tcolorbox}
[title=A translucent box, overlay={\begin{tcbinvclipframe}
\draw[red,line width=1cm] ([xshift=-2mm,yshift=2mm]frame.north west) --([xshift=2mm,yshift=-2mm]frame.south east);
\draw[red,line width=1cm] ([xshift=-2mm,yshift=-2mm]frame.south west) --([xshift=2mm,yshift=2mm]frame.north east);
\end{tcbinvclipframe}]\lipsum[2]\end{tcolorbox}

A translucent box

\begin{tcbclipinterior}
\textit{environment content}
\end{tcbclipinterior}

Defines a Tikz scope which clips to the interior area path.

\begin{tcolorbox}
[enhanced,title=My Title, overlay={\begin{tcbclipinterior}
\draw[red,line width=1cm] (interior.north west)--(interior.south east);
\draw[red,line width=1cm] (interior.south west)--(interior.north east);
\end{tcbclipinterior})]}\lipsum[1]
\end{tcolorbox}

My Title


\begin{tcbcliptitle}
\textit{environment content}
\end{tcbcliptitle}

Defines a Tikz scope which clips to the title area path.

\begin{tcolorbox}
[enhanced,title=My Title,colframe=blue,colback=yellow!10!white, overlay={\begin{tcbcliptitle}\node at (title) \includegraphics[width=\linewidth]{lichtspiel.jpg};\end{tcbcliptitle}}]\lipsum[1]
\end{tcolorbox}

My Title

/tcb/clip title=true|false  
Sets the title to be clipped to the title area.

\tcbset{enhanced,width=5cm,colframe=red!50!white,coltitle=black,  
colbacktitle=yellow!50!white}

\begin{tcolorbox}[title=This is a title which is unbreakable and far too long]
This is a tcolorbox.
\end{tcolorbox}

\begin{tcolorbox}[title=This is a title which is unbreakable and far too long,  
clip title]
This is a tcolorbox.
\end{tcolorbox}

This is a title which is unbreakable and far too long
This is a tcolorbox.
This is a title which is unbreakable and far too long
This is a tcolorbox.

/tcb/clip upper=true|false  
Sets the upper part to be clipped to the interior area.

\newcommand{\mygraphics}[2][{}]{%
  \tcbbox[enhanced,boxsep=0pt,top=0pt,bottom=0pt,left=0pt,  
  right=0pt,boxrule=0.4pt,drop fuzzy shadow,clip upper,  
  colback=black!75!white,toptitle=2pt,bottomtitle=2pt,nobeforeafter,  
  center title,fonttitle=\small\sffamily,title=\detokenize{#2}]  
{\includegraphics[width=\the\dimexpr(\linewidth-4mm)/2\relax]{#2}}
\}

\mygraphics{lichtspiel.jpg}\hfill  
\mygraphics{Basilica_5.png}
The example for `/tcb/clip upper` sizing the box according to the dimensions of the picture. To do it the other way around, the watermark options provide an easy solution.

\begin{tcblisting}{clip lower}
Donau-dampf-schiff-fahrts-ka-pi-t-\text"ans\-m"ut-zen-fran-sen
\end{tcblisting}

\begin{tcblisting}{clip lower}
Donau-dampf-schiff-fahrts-ka-pi-t-\text"ans\-m"ut-zen-fran-sen
\end{tcblisting}

/tcb/clip lower=true|false (default true, initially false)
Sets the lower part to be clipped to the interior area.
9.5 Border Line Option Keys

The following borderline options are applicable for most skins which use \texttt{tikzpicture} as \texttt{/tcb/\texttt{graphical environment}} \cite{P.105}. Therefore, the skin \texttt{standard} \cite{P.167} does not support these border lines, but most other skins, e.g. \texttt{enhanced} \cite{P.169}.

The borderlines are independent from the normal \texttt{tcolorbox} rules. They may be used with or without the \texttt{/tcb/segmentation engine} \cite{P.107}.

The borderlines are stackable, i.e. several different border lines can be used on the same \texttt{tcolorbox}. They are drawn after the box frame and box interior and before overlays or watermarks.

Technically, the normal \texttt{tcolorbox} rules result from a TikZ \texttt{filling} process. The border lines are created by a TikZ \texttt{drawing} process. This can be used to apply different effects.

\texttt{/tcb/borderline=\{\texttt{width}\}\{\texttt{offset}\}\{\texttt{options}\}} (no default, initially unset)

Adds a new borderline to the stack of border lines. This border line is drawn with the given \texttt{\texttt{(width)}} and gets an \texttt{\texttt{(offset)}} computed from the frame outline. A positive \texttt{\texttt{(offset)}} value moves the borderline inside the \texttt{tcolorbox} and a negative \texttt{\texttt{(offset)}} value moves it outside without changing the bounding box.

The border line is drawn along a TikZ path with the given TikZ \texttt{\texttt{(options)}}. Note that the TikZ \texttt{line width} option should not be used here.

The border lines adapt to the rounded corners of the \texttt{tcolorbox}. An inside borderline will switch to sharp corners if necessary, an outside borderline will always be rounded except for \texttt{/tcb/sharp corners} \cite{P.40}.

\begin{tcolorbox}[enhanced,title=Rounded corners,fonttitle=\bfseries,boxsep=5pt, arc=8pt, borderline=0.5pt\{0pt\}\{red\}, borderline=0.5pt\{5pt\}\{blue,dotted\}, borderline=0.5pt\{-5pt\}\{green\} ]
This is a \texttt{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[enhanced,title=Sharp corners,fonttitle=\bfseries,boxsep=5pt, arc=8pt,sharp corners=downhill, borderline=0.5pt\{0pt\}\{red\}, borderline=0.5pt\{5pt\}\{blue,dotted\}, borderline=0.5pt\{-5pt\}\{green\} ]
This is a \texttt{tcolorbox}.
\end{tcolorbox}

Rounded corners

This is a \texttt{tcolorbox}.

Sharp corners

This is a \texttt{tcolorbox}.


My title


/tcb/no borderline (no default, initially set)

Removes all borderlines if set before.

/tcb/show bounding box=(color) (default red, initially unset)

Displays the bounding box borderline of a \texttt{tcolorbox}. Its intended use is debugging and fine tuning. It should not be part of a final document. The optional \texttt{(color)} is the base color for the bounding box borderline.
The following partial borderlines act slightly different from the complete borderlines described before. They ignore rounded corner settings, their length is not modified by their \( \langle \text{offset} \rangle \), they ignore skin settings but adapt to breakable boxes.

\[ /\text{tcb/borderline\ north} = \{ \langle \text{width} \rangle \} \{ \langle \text{offset} \rangle \} \{ \langle \text{options} \rangle \} \]  
(no default, initially unset)

Adds a new borderline with the given \( \langle \text{width} \rangle \) to the north of the \texttt{tcolorbox}. A positive \( \langle \text{offset} \rangle \) value moves the borderline inside the \texttt{tcolorbox} and a negative \( \langle \text{offset} \rangle \) value moves it outside without changing the bounding box.

\[ \begin{tcolorbox} [\texttt{enhanced}, \newline \texttt{borderline\ north}=\{2pt\} \{-2pt\} \{\texttt{red}\}] \newline \texttt{This is a \texttt{tcolorbox}.} \newline \end{tcolorbox} \]

\[ /\text{tcb/borderline\ south} = \{ \langle \text{width} \rangle \} \{ \langle \text{offset} \rangle \} \{ \langle \text{options} \rangle \} \]  
(no default, initially unset)

Adds a new borderline with the given \( \langle \text{width} \rangle \) to the south of the \texttt{tcolorbox}. A positive \( \langle \text{offset} \rangle \) value moves the borderline inside the \texttt{tcolorbox} and a negative \( \langle \text{offset} \rangle \) value moves it outside without changing the bounding box.

\[ \begin{tcolorbox} [\texttt{enhanced}, \newline \texttt{borderline\ south}=\{2pt\} \{-2pt\} \{\texttt{red}\}] \newline \texttt{This is a \texttt{tcolorbox}.} \newline \end{tcolorbox} \]

\[ /\text{tcb/borderline\ east} = \{ \langle \text{width} \rangle \} \{ \langle \text{offset} \rangle \} \{ \langle \text{options} \rangle \} \]  
(no default, initially unset)

Adds a new borderline with the given \( \langle \text{width} \rangle \) to the east of the \texttt{tcolorbox}. A positive \( \langle \text{offset} \rangle \) value moves the borderline inside the \texttt{tcolorbox} and a negative \( \langle \text{offset} \rangle \) value moves it outside without changing the bounding box.

\[ \begin{tcolorbox} [\texttt{enhanced}, \newline \texttt{borderline\ east}=\{2pt\} \{-2pt\} \{\texttt{red}\}] \newline \texttt{This is a \texttt{tcolorbox}.} \newline \end{tcolorbox} \]

\[ /\text{tcb/borderline\ west} = \{ \langle \text{width} \rangle \} \{ \langle \text{offset} \rangle \} \{ \langle \text{options} \rangle \} \]  
(no default, initially unset)

Adds a new borderline with the given \( \langle \text{width} \rangle \) to the west of the \texttt{tcolorbox}. A positive \( \langle \text{offset} \rangle \) value moves the borderline inside the \texttt{tcolorbox} and a negative \( \langle \text{offset} \rangle \) value moves it outside without changing the bounding box.

\[ \begin{tcolorbox} [\texttt{enhanced}, \newline \texttt{borderline\ west}=\{2pt\} \{-2pt\} \{\texttt{red}\}] \newline \texttt{This is a \texttt{tcolorbox}.} \newline \end{tcolorbox} \]
\begin{tcolorbox}[blanker,top=3mm,bottom=3mm,\linebreak borderline horizontal={2pt}{0pt}{red}]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

This is a \textbf{tcolorbox}.

\begin{tcolorbox}[blanker,left=3mm,right=3mm,\linebreak borderline vertical={2pt}{0pt}{red}]
This is a \textbf{tcolorbox}.
My second line.
\end{tcolorbox}

This is a \textbf{tcolorbox}.
My second line.

\begin{tcolorbox}[enhanced,colback=yellow!10!white,boxrule=0pt,frame hidden,\linebreak borderline north={1mm}{-2mm}{red},
borderline south={1mm}{-2mm}{blue},
borderline west={1mm}{-2mm}{green},
borderline east={1mm}{-2mm}{yellow}]
\lipsum[1]
\end{tcolorbox}

9.6 Shadow Option Keys

The following shadow options are applicable for most skins which use \texttt{tikzpicture} as \texttt{/tcb/graphical environment} \cite{p:105}. Therefore, the skin \texttt{standard} \cite{p:167} does not support these shadows, but most other skins, e.g. \texttt{enhanced} \cite{p:169}.

The shadows are stackable, i.e. several different shadows can be used on the same \texttt{tcolorbox}. They are drawn before the box frame is drawn.

\begin{verbatim}
\texttt{/tcb/no shadow} \hspace{1cm} (no default)
Removes all shadows if set before.

\texttt{/tcb/shadow=\{\texttt{xshift}\}\{\texttt{yshift}\}\{\texttt{offset}\}\{\texttt{options}\}} \hspace{1cm} (no default)
Adds a new shadow to the stack of shadows. This shadow is follows the outline of the \texttt{tcolorbox} but is shifted by \texttt{\{xshift\}} and \texttt{\{yshift\}}. The \texttt{\{offset\}} value is a distance value from the frame outline. A positive \texttt{\{offset\}} value shrinks the shadow and a negative \texttt{\{offset\}} value enlarges the shadow. The shadow is filled along a \texttt{Ti\textbackslash kZ} path with the given \texttt{Ti\textbackslash kZ} \texttt{\{options\}}.

The shadows adapt to the rounded corners of the \texttt{tcolorbox}. An shrinked shadow will switch to sharp corners if necessary, an enlarged shadow may become more rounded depending on several factors. But \texttt{/tcb/sharp corners} \cite{p:40} have sharp shadows.

Shadows are not considered for the bounding box computation by default. Large shadows may be overlaped by the following content. But, the bounding box can be adapted if necessary.
\end{verbatim}

\begin{verbatim}
\tcbsset{enhanced,colback=red!5!white, colframe=red!75!black,fonttitle=\bfseries}
\begin{tcolorbox}[title=My own shadow, shadow={2mm}{-1mm}{0mm}{black!50!white}]
This is a tcolorbox.
\end{tcolorbox}
\par
\begin{tcolorbox}[title=Another shadow, shadow={-1mm}{-2mm}{0mm}{fill=blue, opacity=0.5}]
This is a tcolorbox.
\end{tcolorbox}
\par
\begin{tcolorbox}[title=Double shadow, shadow={-1.5mm}{-1.5mm}{0mm}{fill=blue, \opacity{0.25}}, shadow={1.5mm}{-1.5mm}{0mm}{fill=red, \opacity{0.25}}]
This is a tcolorbox.
\end{tcolorbox}
\par
\begin{tcolorbox}[title=Far shadow, shadow={5.5mm}{-3.5mm}{2mm}{fill=black, \opacity{0.25}}]
This is a tcolorbox.
\end{tcolorbox}
\par
\begin{tcolorbox}[title=Halo shadow, shadow={0mm}{0mm}{-1.5mm}\{fill=yellow!75!red, \opacity{0.5}}]
This is a tcolorbox.
\end{tcolorbox}
\end{verbatim}
/tcb/fuzzy shadow={⟨xshift⟩}{⟨yshift⟩}{⟨offset⟩}{⟨step⟩}{⟨options⟩} (no default)

Adds a new fuzzy shadow to the stack of shadows. Actually, this option adds several shadows which appear like a shadow with a fuzzy border. This fuzzy shadow is follows the outline of the \text{tcolorbox} but is shifted by ⟨xshift⟩ and ⟨yshift⟩. The ⟨offset⟩ value is a distance value from the frame outline. A positive ⟨offset⟩ value shrinks the shadow and a negative ⟨offset⟩ value enlarges the shadow. The ⟨⟨step⟩⟩ value describes a shrink offset used for the combination of the partial shadows. The shadow is filled along a Ti\textit{k}Z path with the given Ti\textit{k}Z ⟨⟨options⟩⟩ but any opacity value will be ignored.

\begin{tcolorbox}
\begin{tcolorbox}[title=My own shadow,
fuzzy shadow={2mm}{-1mm}{0mm}{0.1mm}\%
{black!50!white}]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}

\begin{tcolorbox}
\begin{tcolorbox}[title=Another shadow,
fuzzy shadow={-1mm}{-2mm}{0mm}{0.2mm}\%
{fill=blue}]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}

\begin{tcolorbox}
\begin{tcolorbox}[title=Double shadow,
fuzzy shadow={-1.5mm}{-1.5mm}{0mm}{0.1mm}\%
{blue},
fuzzy shadow={1.5mm}{-1.5mm}{0mm}{0.1mm}\%
{red}]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}

\begin{tcolorbox}
\begin{tcolorbox}[title=Far shadow,
fuzzy shadow={5.5mm}{-3.5mm}{0mm}{0.3mm}\%
{black}]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}

\begin{tcolorbox}
\begin{tcolorbox}[title=Glow shadow,
fuzzy shadow={0mm}{0mm}{-1.5mm}{0.15mm}\%
{yellow!75!red}]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}

\begin{tcolorbox}
\begin{tcolorbox}[title=A multi shadow box]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}
/tcb/drop shadow=(color)  (style, default black!50!white)
Adds a new shadow with standard dimensions to the stack of shadows. Optionally, the (color) for the shadow can be changed.

\tcbset{enhanced,colback=red!5!white, colframe=red!75!black,fonttitle=bfseries}
\begin{tcolorbox}[drop shadow]
This is a tcolorbox.
\end{tcolorbox}\par
\begin{tcolorbox}[title=Another shadow, drop shadow=blue]
This is a tcolorbox.
\end{tcolorbox}

/tcb/drop fuzzy shadow=(color)  (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows. Optionally, the (color) for the shadow can be changed.

\tcbset{enhanced,colback=red!5!white, colframe=red!75!black,fonttitle=bfseries}
\begin{tcolorbox}[drop fuzzy shadow]
This is a tcolorbox.
\end{tcolorbox}\par
\begin{tcolorbox}[title=Another shadow, drop fuzzy shadow=blue]
This is a tcolorbox.
\end{tcolorbox}

/tcb/drop midday shadow=(color)  (style, default black!50!white)
Adds a new shadow with standard dimensions to the stack of shadows. Optionally, the (color) for the shadow can be changed.

\tcbset{enhanced,colback=red!5!white, colframe=red!75!black,fonttitle=bfseries}
\begin{tcolorbox}[drop midday shadow]
This is a tcolorbox.
\end{tcolorbox}\par
\begin{tcolorbox}[title=Another shadow, drop midday shadow=blue]
This is a tcolorbox.
\end{tcolorbox}

/tcb/drop fuzzy midday shadow=(color)  (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows. Optionally, the (color) for the shadow can be changed.

\tcbset{enhanced,colback=red!5!white, colframe=red!75!black,fonttitle=bfseries}
\begin{tcolorbox}[drop fuzzy midday shadow]
This is a tcolorbox.
\end{tcolorbox}\par
\begin{tcolorbox}[title=Another shadow, drop fuzzy midday shadow=blue]
This is a tcolorbox.
\end{tcolorbox}
/tcb/halo = \{size\} with \{color\} (style, default 0.9mm with yellow)
Adds a new halo shadow with the given \{color\} which overlaps the colorbox an all sides by \{size\}.

\begin{tcolorbox}[title=My own halo,halo]
This is a tcolorbox.
\end{tcolorbox}
\par
\begin{tcolorbox}[title=Another halo,halo=2mm with green]
This is a tcolorbox.
\end{tcolorbox}

/tcb/fuzzy halo = \{size\} with \{color\} (style, default 0.9mm with yellow)
Adds a new fuzzy halo shadow with the given \{color\} which overlaps the colorbox an all sides by \{size\} plus 0.48mm.

\begin{tcolorbox}[title=My own halo,fuzzy halo]
This is a tcolorbox.
\end{tcolorbox}
\par
\begin{tcolorbox}[title=Another halo,fuzzy halo=2mm with green]
This is a tcolorbox.
\end{tcolorbox}

\begin{tcolorbox}[blank,enhanced jigsaw,boxsep=2pt,arc=2pt, fuzzy halo=2mm with red!50!white, fuzzy halo=1mm with white] \lipsum[1] \end{tcolorbox}

For all following shadows, the optionally given \textit{\texttt{(color)}} for the shadow can be changed equivalent to the preceding examples.

\texttt{/tcb/drop shadow southeast=\{color\} (style, default \texttt{black!50!white})}

Adds a new shadow with standard dimensions to the stack of shadows. This shadow is identical to \texttt{/tcb/drop shadow} \textsuperscript{P.150}.

\begin{tcolorbox}
\texttt{\[drop shadow southeast, enhanced, colback=red!5!white, colframe=red!75!black\]}
This is a tcolorbox.
\end{tcolorbox}

\texttt{/tcb/drop shadow south=\{color\} (style, default \texttt{black!50!white})}

Adds a new shadow with standard dimensions to the stack of shadows. This shadow is identical to \texttt{/tcb/drop midday shadow} \textsuperscript{P.150}.

\begin{tcolorbox}
\texttt{\[drop shadow south, enhanced, colback=red!5!white, colframe=red!75!black\]}
This is a tcolorbox.
\end{tcolorbox}

\texttt{/tcb/drop shadow southwest=\{color\} (style, default \texttt{black!50!white})}

Adds a new shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}
\texttt{\[drop shadow southwest, enhanced, colback=red!5!white, colframe=red!75!black\]}
This is a tcolorbox.
\end{tcolorbox}

\texttt{/tcb/drop shadow west=\{color\} (style, default \texttt{black!50!white})}

Adds a new shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}
\texttt{\[drop shadow west, enhanced, colback=red!5!white, colframe=red!75!black\]}
This is a tcolorbox.
\end{tcolorbox}

\texttt{/tcb/drop shadow northwest=\{color\} (style, default \texttt{black!50!white})}

Adds a new shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}
\texttt{\[drop shadow northwest, enhanced, colback=red!5!white, colframe=red!75!black\]}
This is a tcolorbox.
\end{tcolorbox}

\texttt{/tcb/drop shadow north=\{color\} (style, default \texttt{black!50!white})}

Adds a new shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}
\texttt{\[drop shadow north, enhanced, colback=red!5!white, colframe=red!75!black\]}
This is a tcolorbox.
\end{tcolorbox}
/tcb/drop shadow northeast=(color) (style, default black!50!white)
Adds a new shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}[drop shadow northeast, enhanced, colback=red!5!white, colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

This is a tcolorbox.

/tcb/drop shadow east=(color) (style, default black!50!white)
Adds a new shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}[drop shadow east, enhanced, colback=red!5!white, colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

This is a tcolorbox.

/tcb/drop fuzzy shadow southeast=(color) (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows. This shadow is identical to /tcb/drop fuzzy shadow P.150.

\begin{tcolorbox}[drop fuzzy shadow southeast, enhanced, colback=red!5!white, colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

This is a tcolorbox.

/tcb/drop fuzzy shadow south=(color) (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows. This shadow is identical to /tcb/drop fuzzy midday shadow P.150.

\begin{tcolorbox}[drop fuzzy shadow south, enhanced, colback=red!5!white, colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

This is a tcolorbox.

/tcb/drop fuzzy shadow southwest=(color) (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}[drop fuzzy shadow southwest, enhanced, colback=red!5!white, colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

This is a tcolorbox.

/tcb/drop fuzzy shadow west=(color) (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}[drop fuzzy shadow west, enhanced, colback=red!5!white, colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

This is a tcolorbox.
/tcb/drop fuzzy shadow northwest=(color)  (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}[drop fuzzy shadow northwest,
enhanced,colback=red!5!white,colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

/tcb/drop fuzzy shadow north=(color)  (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}[drop fuzzy shadow north,
enhanced,colback=red!5!white,colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

/tcb/drop fuzzy shadow northeast=(color)  (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}[drop fuzzy shadow northeast,
enhanced,colback=red!5!white,colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}

/tcb/drop fuzzy shadow east=(color)  (style, default black!50!white)
Adds a new fuzzy shadow with standard dimensions to the stack of shadows.

\begin{tcolorbox}[drop fuzzy shadow east,
enhanced,colback=red!5!white,colframe=red!75!black]
This is a tcolorbox.
\end{tcolorbox}
/tcb/lifted shadow={⟨xshift⟩}{⟨yshift⟩}{⟨bend⟩}{⟨step⟩}{⟨options⟩} (no default)
Adds a new lifted shadow to the stack of shadows. Actually, this option adds several shadows which appear like a shadow with a fuzzy border. This lifted shadow follows the outline of the \texttt{tcolorbox} but is shifted by \langle xshift \rangle and \langle yshift \rangle on the lower left corner and by \(-\langle xshift \rangle\) and \langle yshift \rangle on the lower right corner. Additionally, there is a \langle bend \rangle in the middle. The \{\langle step \rangle\} value describes a shrink offset used for the combination of the partial shadows. The shadow is filled along a Ti\texttt{kZ} path with the given Ti\texttt{kZ} \langle options \rangle but any \texttt{opacity} value will be ignored.

\begin{tcolorbox}
\textbf{My own shadow}
\begin{tcolorbox}[title=My own shadow, lifted shadow={1mm}{-2mm}{3mm}{0.1mm}]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}

/tcb/drop lifted shadow={⟨color⟩} (style, default black!50!white)
Adds a new lifted shadow with standard dimensions to the stack of shadows. Optionally, the \langle color \rangle for the shadow can be changed.

\begin{tcolorbox}
\textbf{Another shadow}
\begin{tcolorbox}[drop lifted shadow=blue]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}

/tcb/drop small lifted shadow={⟨color⟩} (style, default black!50!white)
Adds a new small lifted shadow with standard dimensions to the stack of shadows. Optionally, the \langle color \rangle for the shadow can be changed.

\begin{tcolorbox}
\textbf{Another shadow}
\begin{tcolorbox}[drop small lifted shadow=black]
This is a tcolorbox.
\end{tcolorbox}
\end{tcolorbox}
/tcb/drop large lifted shadow={color} (style, default black!50!white)

Adds a new large lifted shadow with standard dimensions to the stack of shadows. Optionally, the {color} for the shadow can be changed.

\begin{tcolorbox}[drop large lifted shadow]
This is a tcolorbox.
\end{tcolorbox}
\par
\begin{tcolorbox}[title=Another shadow, drop large lifted shadow=blue]
This is a tcolorbox.
\end{tcolorbox}
9.7 TikZ Picture Option Keys

The following general options are applicable for skins which use \texttt{tikzpicture} as \texttt{/tcb/graphical environment} \footnote{P.~105}. Therefore, the skin \texttt{standard} \footnote{P.~167} does not support these options, but most other skins, e.g. \texttt{enhanced} \footnote{P.~169}.

\texttt{/tcb/tikz=⟨tikz option list⟩} \quad \text{(no default, initially empty)}

Adds the given \texttt{⟨tikz option list⟩} to the main \texttt{tikzpicture} environment used to draw the color box, see \cite{20}. If this option is applied a second time, the new \texttt{⟨tikz option list⟩} is appended to the current option list.

\begin{verbatim}
\tcbset{enhanced,colback=red!5!white,
         colframe=red!75!black,fonttitle=\bfseries}
\begin{tcolorbox}[title=Transparent box,
         tikz={opacity=0.5,transparency group}]
This is a tcolorbox.
\end{tcolorbox}
\end{verbatim}

\begin{verbatim}
\tcbset{enhanced,colback=red!5!white,
         colframe=red!75!black,fonttitle=\bfseries,
         fontupper=\bfseries\Huge,
         center title,center upper}
\begin{tcolorbox}[title=Rotated box,
         tikz={rotate=30}]
Sold!
\end{tcolorbox}
\end{verbatim}

\texttt{/tcb/tikz reset} \quad \text{(initially set)}

Removes all options given by \texttt{/tcb/tikz}.

\texttt{/tcb/at begin tikz=⟨tikz code⟩} \quad \text{(no default, initially empty)}

The given \texttt{⟨tikz code⟩} is executed at the beginning of the \texttt{tikzpicture} environment after the TikZ option \texttt{execute at begin picture} was applied. If this option is applied a second time, the new \texttt{⟨tikz code⟩} is appended to the current code.

\texttt{/tcb/at begin tikz reset} \quad \text{(initially set)}

Removes all code given by \texttt{/tcb/at begin tikz}.

\texttt{/tcb/at end tikz=⟨tikz code⟩} \quad \text{(no default, initially empty)}

The given \texttt{⟨tikz code⟩} is executed at the ending of the \texttt{tikzpicture} environment before the TikZ option \texttt{execute at end picture} was applied. If this option is applied a second time, the new \texttt{⟨tikz code⟩} is appended to the current code.

\texttt{/tcb/at end tikz reset} \quad \text{(initially set)}

Removes all code given by \texttt{/tcb/at end tikz}.
/tcb/rotate=(angle)  (no default, initially unset)
Rotates the tcolorbox by the given \( \langle \text{angle} \rangle \). Note that this is a Ti\( \text{k} \)Z coordinate transformation i.e. not all graphical elements like shadings will really be rotated.

\begin{tcolorbox}[title=Rotated box, rotate=30]
This is a tcolorbox.
\end{tcolorbox}

/tcb/scale=(fraction)  (no default, initially unset)
Scales the tcolorbox by the given \( \langle \text{fraction} \rangle \). Note that this is a Ti\( \text{k} \)Z coordinate transformation i.e. not all graphical elements like line widths will really be scaled.

\begin{tcolorbox}[title=Scaled box, scale=0.5]
This is a tcolorbox.
\end{tcolorbox}
\begin{tcolorbox}[title=Scaled box, scale=1.25]
This is a tcolorbox.
\end{tcolorbox}

/tcb/remember  (style, initially unset)
Shortcut for \texttt{tikz={remember picture}}. This allows one to reference nodes in other Ti\( \text{k} \)Z pictures.

\begin{tcolorbox}[enhanced, remember, colback=red!5!white, colframe=red!75!black, fonttitle=\bfseries, title=The four corners of a paper, overlay={\draw[red!50!white, line width=1mm, opacity=0.5, shorten >=3mm]
(frame.north west) edge[->] (current page.north west)
(frame.north east) edge[->] (current page.north east)
(frame.south west) edge[->] (current page.south west)
(frame.south east) edge[->] (current page.south east);}]
This is a tcolorbox.
\end{tcolorbox}
\tcb\remember\ as=\langle\ name\ \rangle\ (\text{style, \ no\ default, \ initially\ unset})

The \texttt{frame} node will be remembered by the given \langle\ name\ \rangle\ to be referenced in other \LaTeX\ pictures.

% \usepackage{lipsum}
\newtcolorbox{mybox}[1]\[1\][\]{enhanced,colframe=blue!75!black,colback=blue!10!white, fonttitle=\bfseries,#1}
\begin{mybox}[title=First Box,nobeforeafter,width=\linewidth/4,remember as=one]
This is a test.
\end{mybox}
\begin{mybox}[title=Second Box,nobeforeafter,width=\linewidth/4,remember as=two]
This is a test.
\end{mybox}
\begin{mybox}[title=Third Box,nobeforeafter,width=\linewidth/4,remember as=three]
This is a test.
\end{mybox}
\lipsum[2]
\begin{mybox}[title=Fourth Box,remember as=four]
This is a test.
\end{mybox}
\begin{tikzpicture}[overlay,remember picture,line width=1mm,draw=red!75!black]
\draw[->] (one.east) to[bend right] node[above] {A} (two.west);
\draw[->] (two.east) to[bend left] node[above] {B} (three.west);
\draw[->] (three.east) to[bend left=90] node[right] {C} (four.east);
\draw[->] (four.west) to[bend left=90] node[left] {D} (one.west);
\end{tikzpicture}


% \begin{mybox}
% This is a test.
% \end{mybox}
% \begin{mybox}
% This is a test.
% \end{mybox}
% \begin{mybox}
% This is a test.
% \end{mybox}
% \begin{mybox}
% This is a test.
% \end{mybox}
% \begin{tikzpicture}
% \draw[->] (one.east) to[bend right] node[above] {A} (two.west);
% \draw[->] (two.east) to[bend left] node[above] {B} (three.west);
% \draw[->] (three.east) to[bend left=90] node[right] {C} (four.east);
% \draw[->] (four.west) to[bend left=90] node[left] {D} (one.west);
% \end{tikzpicture}

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9.8 Underlay Option Keys

Underlays are quite similar to overlays described in Section 4.11 on page 61. Underlays are drawn after the frame and interior are drawn and before overlays and the text content is drawn; see Section 8.4 on page 113 for the general drawing scheme.

The differences between underlays and overlays are:

- Underlays are not applicable for the skins standard \( ^{P.167} \) and standard jigsaw \( ^{P.168} \), whereas overlays are applicable also for these skins. The skin spartan \( ^{P.205} \) supports underlays but no overlays.

\[ \text{If an underlay is used with the standard} \quad ^{P.167} \text{ skin, it is silently ignored.} \]

- Underlays are stackable, i.e. several different underlays can be used on the same \texttt{tcolorbox}. Overlays are not stackable by default (but with some help of the library \texttt{hooks}).

- Boxed titles are implemented with underlays (Section 9.2 on page 124), watermarks are implemented with overlays (Section 9.3 on page 131).

\[ \text{/tcb/underlay=⟨graphical code⟩} \quad \text{(no default, initially unset)} \]

Adds \( ⟨\text{graphical code}⟩ \) to the box drawing process. This \( ⟨\text{graphical code}⟩ \) is drawn after the frame and interior and before the text content.

\[ \text{/tcb/no underlay} \quad \text{(style, no default, initially set)} \]

Removes the underlay if set before.
/tcb/underlay broken\=(graphical code) (no default, initially unset)
If the box is set to be /tcb/breakable\=P.297 and is broken actually, then the (graphical code) is added to the box drawing process. /tcb/underlay\=P.160 overwrites this key.

/tcb/underlay unbroken\=(graphical code) (no default, initially unset)
If the box is set to be /tcb/unbreakable\=P.208 but is not broken actually or if the box is set to be /tcb/unbreakable\=P.208, then the (graphical code) is added to the box drawing process. /tcb/underlay\=P.160 overwrites this key.

/tcb/no underlay unbroken (style, no default, initially set)
Removes the unbroken underlay if set before.

/tcb/underlay first\=(graphical code) (no default, initially unset)
If the box is set to be /tcb/breakable\=P.297 and is broken actually, then the (graphical code) is added to the box drawing process for the first part of the break sequence. /tcb/underlay\=P.160 overwrites this key.

/tcb/no underlay first (style, no default, initially set)
Removes the first underlay if set before.

/tcb/underlay middle\=(graphical code) (no default, initially unset)
If the box is set to be /tcb/breakable\=P.297 and is broken actually, then the (graphical code) is added to the box drawing process for the middle parts (if any) of the break sequence. /tcb/underlay\=P.160 overwrites this key.

/tcb/no underlay middle (style, no default, initially set)
Removes the middle underlay if set before.

/tcb/underlay last\=(graphical code) (no default, initially unset)
If the box is set to be /tcb/breakable\=P.297 and is broken actually, then the (graphical code) is added to the box drawing process for the last part of the break sequence. /tcb/underlay\=P.160 overwrites this key.

/tcb/no underlay last (style, no default, initially set)
Removes the last underlay if set before.

/tcb/underlay boxed title\=(graphical code) (no default, initially unset)
If the box has a boxed title, see Section 9.2 on page 124, then the (graphical code) is added to the box drawing process before the boxed title is drawn.

/tcb/no underlay boxed title (style, no default, initially set)
Removes the boxed title underlay if set before.

/tcb/underlay unbroken and first\=(graphical code) (no default, initially unset)
This is an abbreviation for setting /tcb/underlay unbroken and /tcb/underlay first together. /tcb/underlay\=P.160 overwrites this key.

/tcb/underlay middle and last\=(graphical code) (no default, initially unset)
This is an abbreviation for setting /tcb/underlay middle and /tcb/underlay last together. /tcb/underlay\=P.160 overwrites this key.

/tcb/underlay unbroken and last\=(graphical code) (no default, initially unset)
This is an abbreviation for setting /tcb/underlay unbroken and /tcb/underlay last together. /tcb/underlay\=P.160 overwrites this key.

/tcb/underlay first and middle\=(graphical code) (no default, initially unset)
This is an abbreviation for setting /tcb/underlay first and /tcb/underlay middle together. /tcb/underlay\=P.160 overwrites this key.
9.9 Finish Option Keys

Finishes are quite similar to underlays described in Section 9.8 on page 160 and overlays described in Section 4.11 on page 61. Finishes are drawn after the text content is drawn; see Section 8.4 on page 113 for the general drawing scheme. Therefore, a finish will reduce the readability of the text content.

Finishes are intended for special effects like highlights or glosses or text over text.

- Finishes are only applicable for the skins enhanced\textsuperscript{P.169}, empty\textsuperscript{P.196}, freelance\textsuperscript{P.208}, bicolor\textsuperscript{P.182}, beamer\textsuperscript{P.187}, and widget\textsuperscript{P.192}.

- If a finish is used with the standard\textsuperscript{P.167} skin, it is silently ignored.

- Finishes are stackable, i.e. several different finishes can be used on the same tcolorbox.

\texttt{/tcb/finish=⟨graphical code⟩} (no default, initially unset)

Adds \langle graphical code \rangle to the box drawing process. This \langle graphical code \rangle is drawn after the text content.

\begin{mybox}[title=My box]
\lipsum[2]
\end{mybox}

My box


\begin{mybox}[title=My box, finish={\node[draw,fill=white,fill opacity=0.85,inner sep=5mm, rounded corners] at (frame.center) {\Huge\bfseries Finish!};}]
\lipsum[2]
\end{mybox}

My box

Finish!
/tcb/no finish  
Removes the finish if set before.

/tcb/finish broken=(graphical code)  
(no default, initially unset)  
If the box is set to be /tcb/breakable \textsuperscript{P.297} and is broken actually, then the \textit{(graphical code)} is added to the box drawing process. /tcb/finish \textsuperscript{P.162} overwrites this key.

/tcb/finish unbroken=(graphical code)  
(no default, initially unset)  
If the box is set to be /tcb/breakable \textsuperscript{P.297} but is not broken actually or if the box is set to be /tcb/unbreakable \textsuperscript{P.208}, then the \textit{(graphical code)} is added to the box drawing process. /tcb/finish \textsuperscript{P.162} overwrites this key.

/tcb/no finish unbroken  
(style, no default, initially set)  
Removes the unbroken finish if set before.

/tcb/finish first=(graphical code)  
(no default, initially unset)  
If the box is set to be /tcb/breakable \textsuperscript{P.297} and is broken actually, then the \textit{(graphical code)} is added to the box drawing process for the first part of the break sequence. /tcb/finish \textsuperscript{P.162} overwrites this key.

/tcb/no finish first  
(style, no default, initially set)  
Removes the first finish if set before.

/tcb/finish middle=(graphical code)  
(no default, initially unset)  
If the box is set to be /tcb/breakable \textsuperscript{P.297} and is broken actually, then the \textit{(graphical code)} is added to the box drawing process for the middle parts (if any) of the break sequence. /tcb/finish \textsuperscript{P.162} overwrites this key.

/tcb/no finish middle  
(style, no default, initially set)  
Removes the middle finish if set before.

/tcb/finish last=(graphical code)  
(no default, initially unset)  
If the box is set to be /tcb/breakable \textsuperscript{P.297} and is broken actually, then the \textit{(graphical code)} is added to the box drawing process for the last part of the break sequence. /tcb/finish \textsuperscript{P.162} overwrites this key.

/tcb/no finish last  
(style, no default, initially set)  
Removes the last finish if set before.

/tcb/finish unbroken and first=(graphical code)  
(no default, initially unset)  
This is an abbreviation for setting /tcb/finish unbroken and /tcb/finish first together. /tcb/finish \textsuperscript{P.162} overwrites this key.

/tcb/finish middle and last=(graphical code)  
(no default, initially unset)  
This is an abbreviation for setting /tcb/finish middle and /tcb/finish last together. /tcb/finish \textsuperscript{P.162} overwrites this key.

/tcb/finish unbroken and last=(graphical code)  
(no default, initially unset)  
This is an abbreviation for setting /tcb/finish unbroken and /tcb/finish last together. /tcb/finish \textsuperscript{P.162} overwrites this key.

/tcb/finish first and middle=(graphical code)  
(no default, initially unset)  
This is an abbreviation for setting /tcb/finish first and /tcb/finish middle together. /tcb/finish \textsuperscript{P.162} overwrites this key.
9.10 Jigsaw Skin Variants

As described in Section 8.1 on page 105, a \texttt{tcolorbox} is drawn by up to four \textit{engines}. Typically, the \textit{frame} engine fills the complete box area with color and the other engines fill certain areas with other colors. Finally, only the area which you see as \textit{frame} of the box will display the frame color. For most applications, this is a good approach.

For certain boxes, a more delicate procedure is needed. E.g., if the box should be translucent, an already painted area cannot be made unpainted. Therefore, more elaborate frame engines saw holes into the frame where the interior area and optionally the title area will be painted. The resulting skins are called \textit{jigsaw} skins. For \texttt{standard} \cite{p:167} and \texttt{enhanced} \cite{p:169}, there are variants called \texttt{standard jigsaw} \cite{p:168} and \texttt{enhanced jigsaw} \cite{p:176}.

\begin{tikzpicture}
\path [use as bounding box] (0,0.8) rectangle +(0.1,0.1);
\shadedraw [shading=ball] (0,0) circle (1cm);
\shadedraw [ball color=red] (3,-2.2) circle (1cm);
\end{tikzpicture}

\begin{tcolorbox}[title=A normal box]
\lipsum[2]
\end{tcolorbox}

\begin{tcolorbox}[title=A translucent jigsaw box, enhanced jigsaw, opacityback=0.35]
\lipsum[2]
\end{tcolorbox}
9.11 Draft Mode

To reduce the compilation time while drafting a document, the draft mode can be applied. Basically, it changes all skins to spartan\textsuperscript{P.205} and sets the /tcb/fit algorithm\textsuperscript{P.323} to squeeze. Especially, when fuzzy shadows are used, the speedup will be considerable high.

It is strongly recommended that the draft mode is 	extit{not} used for the final document. Use spartan\textsuperscript{P.205} directly, if you want to stay with it. The draft mode implementation may change in future.

Normally, switching to the draft mode should not alter the geometry of your document. Since overlays are deactivated, any code placed there (e.g. counter changes) is not executed anymore! Also, /tcb/remember as\textsuperscript{P.159} will not have any effect. You may exclude critical code with \texttt{tcbinterruptdraftmode} / \texttt{tcbcontinuedraftmode} from converting to draft mode.

\texttt{tcbstartdraftmode}

Any following \texttt{tcolorbox} code is put into draft mode. All skin settings are overruled with spartan\textsuperscript{P.205}. Overlays, watermarks, shadows, borderlines, and rounded corners are deactivated for all \texttt{tcolorbox} layers.

\texttt{tcbstopdraftmode}

The draft mode is deactivated for the following code.

\texttt{tcbinterruptdraftmode}

If the compilation is in draft mode, the draft mode is deactivated until a following \texttt{tcbcontinuedraftmode} is detected.

If the compilation is not in draft mode, nothing happens and a following \texttt{tcbcontinuedraftmode} will not start the draft mode.

The pair \texttt{tcbinterruptdraftmode} and \texttt{tcbcontinuedraftmode} cannot be used nested.

\texttt{tcbcontinuedraftmode}

Continues the draft mode which was suspended by a preceding \texttt{tcbinterruptdraftmode}. Nothing happens, if there was no draft mode before \texttt{tcbinterruptdraftmode}.

Code, which is place between \texttt{tcbinterruptdraftmode} and \texttt{tcbcontinuedraftmode} is shielded from draft mode.

\texttt{/tcb/draftmode=true|false} \hspace{1em} (default \texttt{true}, initially \texttt{false})

If set to true, the draft mode is started. If set to false, the draft mode is stopped.

```
\newtcolorbox{mybeamer}[2]\{beamer,colback=Salmon!50!white, colframe=FireBrick!75!black,adjusted title={#2},#1\}
\begin{mybeamer}{Beamer box}
This box looks like a box provided by the \texttt{beamer} class.
\end{mybeamer}
```

```
\begin{mybeamer}{Beamer box}
This box looks like a box provided by the \texttt{beamer} class.
\end{mybeamer}
```

Beamer box

This box looks like a box provided by the \texttt{beamer} class.
9.12 Skin Family 'standard'

Note that the option keys \texttt{/tcb/frame style}^\textsuperscript{P.117}, \texttt{/tcb/interior style}^\textsuperscript{P.118}, \texttt{/tcb/segmentation style}^\textsuperscript{P.120}, and \texttt{/tcb/title style}^\textsuperscript{P.120} are not be applicable to the standard skin. Also, watermarks (see Subsection 9.3) are not usable with the standard skin.

\texttt{/tcb/skin=standard} (skin)

This is the standard skin from the core package. All drawing engines are set to type \texttt{standard}. The drawing is based on \texttt{pgf} commands and does not need the \texttt{tikz} package.

Environment and engines for the skin 'standard'

\texttt{/tcb/graphical environment}^\textsuperscript{P.105}: \texttt{pgfpicture}
\texttt{/tcb/frame engine}^\textsuperscript{P.106}: \texttt{standard}
\texttt{/tcb/interior titled engine}^\textsuperscript{P.106}: \texttt{standard}
\texttt{/tcb/interior engine}^\textsuperscript{P.107}: \texttt{standard}
\texttt{/tcb/segmentation engine}^\textsuperscript{P.107}: \texttt{standard}
\texttt{/tcb/title engine}^\textsuperscript{P.107}: \texttt{standard}

\texttt{/tcb/standard} (style, no value)

This is an abbreviation for setting \texttt{skin=standard}.

\begin{tcbraster}
\[standard,raster equal height,raster columns=4,
\quad \text{colback=LightGreen, colframe=DarkGreen, colbacktitle=LimeGreen!75!DarkGreen,}
\quad \text{left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}\]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
This is the standard jigsaw skin from the core package. It differs from the skin `standard` \(^{P.167}\) by its frame engine, see Section 9.10 on page 164.

<table>
<thead>
<tr>
<th>Environment and engines for the skin <code>standard jigsaw</code></th>
</tr>
</thead>
<tbody>
<tr>
<td>/tcb/graphical environment (^{P.105}): pgfpicture</td>
</tr>
<tr>
<td>/tcb/frame engine (^{P.106}): standardjigsaw</td>
</tr>
<tr>
<td>/tcb/interior titled engine (^{P.106}): standard</td>
</tr>
<tr>
<td>/tcb/interior engine (^{P.107}): standard</td>
</tr>
<tr>
<td>/tcb/segmentation engine (^{P.107}): standard</td>
</tr>
<tr>
<td>/tcb/title engine (^{P.107}): standard</td>
</tr>
</tbody>
</table>

This is an abbreviation for setting `skin=standard jigsaw`.

```latex
\begin{tcbraster}[standard jigsaw,raster equal height,raster columns=4,
    colback=LightGreen,colframe=DarkGreen,colbacktitle=LimeGreen!75!DarkGreen,
    opacityframe=0.5,opacityback=0.5,opacitybacktitle=0.5,
    left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
```

This is my content.

This is my content.

More content.

My title

This is my content.

My title

This is my content.

More content.
9.13 Skin Family 'enhanced'

If you like the standard appearance of a \texttt{tcolorbox} but you want to have some 'enhanced' features, the \texttt{enhanced} skin is what you are looking for.

\begin{tcb}{enhanced,\texttt{raster equal height,raster columns=4,}\texttt{colback=LightGreen,\texttt{colframe=DarkGreen,\texttt{colbacktitle=LimeGreen!75!DarkGreen,\texttt{left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}}}\
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.\texttt{tcblower}More content.\texttt{\end{tcolorbox}}
\begin{tcolorbox}[\texttt{adjusted title=My title}]\texttt{This is my content.}\texttt{\end{tcolorbox}}
\begin{tcolorbox}[\texttt{adjusted title=My title}]\texttt{This is my content.}\texttt{tcblower}More content.\texttt{\end{tcolorbox}}
\end{tcb}

This is my content. This is my content. My title This is my content. More content. My title This is my content. More content.

\texttt{/tcb/skin=enhanced} (skin)

This skin translates the drawing commands of the core package into \texttt{tikz} path commands. Therefore, it allows all \texttt{tikz} high level options for these paths and has more flexibility compared to the \texttt{standard} skin. You pay for this with some prolonged compilation time. The \texttt{tikz} path options can be given with the option keys \texttt{/tcb/frame style}, \texttt{/tcb/interior style}, \texttt{/tcb/segmentation style}, and \texttt{/tcb/title style}.

Environment and engines for the skin 'enhanced'

\begin{center}
\begin{tabular}{|l|}
\hline
\texttt{/tcb/graphical environment}: \texttt{tikzpicture} \\
\texttt{/tcb/frame engine}: \texttt{path} \\
\texttt{/tcb/interior titled engine}: \texttt{path} \\
\texttt{/tcb/interior engine}: \texttt{path} \\
\texttt{/tcb/segmentation engine}: \texttt{path} \\
\texttt{/tcb/title engine}: \texttt{path} \\
\hline
\end{tabular}
\end{center}

\texttt{/tcb/enhanced} (style, no value)

This is an abbreviation for setting \texttt{skin=enhanced}. 
\vspace{1cm}
With the 'enhanced' skin, it is quite easy to produce fancy looking effects.

Note that this is still a \texttt{tcolorbox}.

Of course, skins can be used for listings also.

\begin{equation}
\int_1^2 \frac{1}{x} \, dx = \ln(2).
\end{equation}

Of course, skins can be used for listings also.
/tcb/enhanced standard (style, no value)
For unbreakable boxes, this is identical to using /tcb/enhanced. But, for breakable boxes, the break sequence is identical to the standard skin, see Section 15.6 from page 306.

/tcb/blank (style, initially unset)
This style relies on the skin enhanced. All drawing operations are hidden and all margins are set to 0pt. See /tcb/blanker for switching off the drawing engines.

\begin{tcolorbox}[blank,watermark text=A blank box]
\lipsum[1]
\end{tcolorbox}

\texttt{\textbackslash tcbline}

Sometimes, a line is only a line. With \texttt{\textbackslash tcblower} you separate the box content into two functional units. \texttt{\textbackslash tcbline} draws only a line which looks like the segmentation line between upper and lower part. Furthermore, you can use \texttt{\textbackslash tcbline} more than just once. \texttt{\textbackslash tcbline} always uses the \texttt{path} drawing engine. Therefore, the \texttt{/tcb/segmentation style} can be applied.

\begin{tcolorbox}[colupper=red!50!black,collower=green!50!black]
\lipsum[1]
\texttt{\textbackslash tcbline}
\lipsum[2]
\texttt{\textbackslash tcblower}
\lipsum[3]
\texttt{\textbackslash tcbline}
\lipsum[4]
\end{tcolorbox}


\texttt{\textbackslash tcbline*}

Equivalent to \texttt{\textbackslash tcbline}, but in a breakable box, \texttt{\textbackslash tcbline*} is removed if at a page/box break. Also, it is removed at the end of a box.
This is a flavor of enhanced\textsuperscript{P.169} which is used as a first part in a break sequence for enhanced\textsuperscript{P.169}. Nevertheless, this skin can be applied independently.

\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
This is a flavor of enhanced which is used as a middle part in a break sequence for enhanced. Nevertheless, this skin can be applied independently.

### Environment and engines for the skin `enhancedmiddle`

- **/tcb/graphical environment**: \texttt{tikzpicture}
- **/tcb/frame engine**: \texttt{pathmiddle}
- **/tcb/interior titled engine**: \texttt{pathmiddle}
- **/tcb/interior engine**: \texttt{pathmiddle}
- **/tcb/segmentation engine**: \texttt{path}
- **/tcb/title engine**: \texttt{pathmiddle}

\begin{tcbraster}[skin=enhancedmiddle,raster equal height,raster columns=4, colback=LightGreen,colframe=DarkGreen,colbacktitle=LimeGreen!75!DarkGreen, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
This is a flavor of enhanced\textsuperscript{P.169} which is used as a \textit{last} part in a break sequence for enhanced\textsuperscript{P.169}. Nevertheless, this skin can be applied independently.

**Environment and engines for the skin ‘enhancedlast’**

- /tcb/graphical\_environment\textsuperscript{P.105}: tikzpicture
- /tcb/frame\_engine\textsuperscript{P.106}: pathlast
- /tcb/interior\_titled\_engine\textsuperscript{P.106}: pathlast
- /tcb/interior\_engine\textsuperscript{P.107}: pathlast
- /tcb/segmentation\_engine\textsuperscript{P.107}: path
- /tcb/title\_engine\textsuperscript{P.107}: pathlast

\begin{tcbraster}[skin=enhancedlast,raster equal height,raster columns=4,\linebreak colback=LightGreen,colframe=DarkGreen,colbacktitle=LimeGreen!75!DarkGreen,\linebreak left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]  
\begin{tcolorbox}
This is my content.  
\end{tcolorbox}\begin{tcolorbox}
This is my content.\tcblower More content.  
\end{tcolorbox}\begin{tcolorbox}[adjusted title=My title]
This is my content.  
\end{tcolorbox}\begin{tcolorbox}[adjusted title=My title]  
This is my content.\tcblower More content.  
\end{tcolorbox}  
\end{tcbraster}
This is the jigsaw variant of skin enhanced. It differs by its frame engine, see Section 9.10 on page 164.

Environment and engines for the skin 'enhanced jigsaw'

\begin{tcbraster}
\[ enhanced jigsaw, raster equal height, raster columns=4, 
\text{colback}=\text{LightGreen}, \text{colframe}=\text{DarkGreen}, \text{colbacktitle}=\text{LimeGreen!75!DarkGreen}, 
\text{opacityframe}=0.5, \text{opacityback}=0.5, \text{opacitybacktitle}=0.5, 
\text{left}=1\text{mm}, \text{right}=1\text{mm}, \text{top}=1\text{mm}, \text{bottom}=1\text{mm}, \text{middle}=1\text{mm} \]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[\text{adjusted title}=\text{My title}]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[\text{adjusted title}=\text{My title}]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}

This is an abbreviation for setting skin=enhanced jigsaw.
This is the jigsaw variant of skin `enhancedfirst` \textsuperscript{P.173}. It differs by its frame engine, see Section 9.10 on page 164.

---

**Environment and engines for the skin ‛enhancedfirst jigsaw’**

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Engine Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>graphical environment</td>
<td>tikzpicture</td>
</tr>
<tr>
<td>frame engine</td>
<td>pathfirstjigsaw</td>
</tr>
<tr>
<td>interior titled engine</td>
<td>pathfirstjigsaw</td>
</tr>
<tr>
<td>interior engine</td>
<td>pathfirstjigsaw</td>
</tr>
<tr>
<td>segmentation engine</td>
<td>pathfirstjigsaw</td>
</tr>
<tr>
<td>title engine</td>
<td>pathfirstjigsaw</td>
</tr>
</tbody>
</table>

---

\begin{tcbraster}[
 skin=enhancedfirst jigsaw, raster equal height, raster columns=4, colback=LightGreen, colframe=DarkGreen, colbacktitle=LimeGreen!75!DarkGreen, opacityframe=0.5, opacityback=0.5, opacitybacktitle=0.5, left=1mm, right=1mm, top=1mm, bottom=1mm, middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\end{tcbraster}
This is the jigsaw variant of skin enhancedmiddle. It differs by its frame engine, see Section 9.10 on page 164.

Environment and engines for the skin 'enhancedmiddle jigsaw'

- /tcb/graphical environment: tikzpicture
- /tcb/frame engine: pathmiddlejigsaw
- /tcb/interior titled engine: pathmiddlejigsaw
- /tcb/interior engine: pathmiddle
- /tcb/segmentation engine: path
- /tcb/title engine: pathmiddle

This styles relies on the skin enhancedmiddle jigsaw. It is intended to be used as an optical marker like a highlighter pen.

\begin{tcolorbox}[marker]
\lipsum[2]
\end{tcolorbox}
This example demonstrates the creation of several text marker environments based on enhancedmiddle\cite{P.174}.

\tcset{textmarker/.style={%
    skin=enhancedmiddle jigsaw, breakable, parbox=false,
    boxrule=0mm, leftrule=5mm, rightrule=5mm, boxsep=0mm, arc=0mm, outer arc=0mm,
    left=3mm, right=3mm, top=1mm, bottom=1mm, toptitle=1mm, bottomtitle=1mm, oversize}}

\newtcolorbox{yellow}{textmarker, colback=yellow!5!white, colframe=yellow}
\newtcolorbox{orange}{textmarker, colback=DarkOrange!5!white, colframe=DarkOrange!75!yellow}
\newtcolorbox{red}{textmarker, colback=red!5!white, colframe=red}
\newtcolorbox{blue}{textmarker, colback=DeepSkyBlue!5!white, colframe=DeepSkyBlue}
\newtcolorbox{green}{textmarker, colback=Chartreuse!5!white, colframe=Chartreuse}
\newtcolorbox{rainbow}{textmarker, interior hidden, frame style={top color=blue, bottom color=red, middle color=green}}

\begin{yellow}
\lipsum[1-3]
\end{yellow}
\begin{orange}
\lipsum[4]
\end{orange}
\begin{red}
\lipsum[5]
\end{red}
\begin{green}
\lipsum[6]
\end{green}
\begin{blue}
\lipsum[7]
\end{blue}
\begin{rainbow}
\lipsum[8]
\end{rainbow}


This is the jigsaw variant of skin `enhancedlast`\textsuperscript{P.175}. It differs by its frame engine, see Section 9.10 on page 164.

### Environment and engines for the skin 'enhancedlast'

<table>
<thead>
<tr>
<th>Environment/Engine</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/tcb/graphical environment</code></td>
<td>105</td>
</tr>
<tr>
<td><code>/tcb/frame engine</code></td>
<td>106</td>
</tr>
<tr>
<td><code>/tcb/interior titled engine</code></td>
<td>106</td>
</tr>
<tr>
<td><code>/tcb/interior engine</code></td>
<td>107</td>
</tr>
<tr>
<td><code>/tcb/segmentation engine</code></td>
<td>107</td>
</tr>
<tr>
<td><code>/tcb/title engine</code></td>
<td>107</td>
</tr>
</tbody>
</table>

\begin{tcbraster}[skin=enhancedlast jigsaw,raster equal height,raster columns=4, colback=LightGreen,colframe=DarkGreen,colbacktitle=LimeGreen!75!DarkGreen, opacityframe=0.5,opacityback=0.5,opacitybacktitle=0.5, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm] \begin{tcolorbox} This is my content. \end{tcolorbox} \begin{tcolorbox} This is my content. \tcblower More content. \end{tcolorbox} \begin{tcolorbox}[adjusted title=My title] This is my content. \end{tcolorbox} \begin{tcolorbox}[adjusted title=My title] This is my content. \tcblower More content. \end{tcolorbox} \begin{tcolorbox} This is my content. \end{tcolorbox} \begin{tcolorbox} This is my content. \tcblower More content. \end{tcolorbox} \end{tcbraster}
9.14 Skin Family 'bicolor'

This skin is quite similar to the standard and enhanced skin. But instead of a segmentation line, the optional lower part of the box is filled with a different color or drawn with a different style.

Environment and engines for the skin 'bicolor'

- The most basic usage of this skin is to set the background color of the lower part by and all other options like for the standard skin.

- The more advanced usage of this skin is to apply the frame style and the interior style like for the enhanced skin. Also, the segmentation style can be used, but it is applied to the whole lower part.

\begin{tcolorbox}[skin=bicolor,title=The title, frame style={top color=FireBrick, bottom color=FireBrick!15!white,draw=black}, interior style={left color=Salmon,right color=Salmon!50!white}, segmentation style={right color=Salmon,left color=Salmon!50!white}]

\begin{tcblower}
The upper part.
\end{tcblower}
\end{tcolorbox}

The title

The upper part.

The lower part.

\begin{tcolorbox}[skin=bicolor,title=The title, colframe=FireBrick!75!black,colback=Salmon!50!white,colbacklower=Salmon]

\begin{tcblower}
The upper part.
\end{tcblower}
\end{tcolorbox}

The title

The upper part.

The lower part.

\begin{verbatim}
\begin{tcolorbox}[skin=bicolor,title=The title, colframe=FireBrick!75!black,colback=Salmon!50!white,colbacklower=Salmon]

\begin{tcblower}
The upper part.
\end{tcblower}
\end{tcolorbox}

\begin{verbatim}
\begin{tcolorbox}[skin=bicolor,title=The title, frame style={top color=FireBrick, bottom color=FireBrick!15!white,draw=black}, interior style={left color=Salmon,right color=Salmon!50!white}, segmentation style={right color=Salmon,left color=Salmon!50!white}]

\begin{tcblower}
The upper part.
\end{tcblower}
\end{tcolorbox}

\begin{verbatim}
\begin{tcolorbox}[skin=bicolor,title=The title, colframe=FireBrick!75!black,colback=Salmon!50!white,colbacklower=Salmon]

\begin{tcblower}
The upper part.
\end{tcblower}
\end{tcolorbox}

\begin{verbatim}
This is my content.

This is my content.

More content.

This is my content.

More content.

This is my content.

My title

This is my content.

More content.

My title

This is my content.

More content.

The option `-a` automatically stages all tracked and modified files before the commit.

This can be combined with the message option `-m` as seen in the third line.
This is a flavor of bicolor$^{P.182}$ which is used as a first part in a break sequence for bicolor$^{P.182}$. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'bicolorfirst'

- `/tcb/graphical environment` $^{P.105}$: tikzpicture
- `/tcb/frame engine` $^{P.106}$: pathfirst
- `/tcb/interior titled engine` $^{P.106}$: special
- `/tcb/interior engine` $^{P.107}$: special
- `/tcb/segmentation engine` $^{P.107}$: special
- `/tcb/title engine` $^{P.107}$: pathfirst

```
\begin{tcbraster}[skin=bicolorfirst,raster equal height,raster columns=4,
colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen,
colbacktitle=LimeGreen!75!DarkGreen,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
```
This is a flavor of \texttt{bicolor} which is used as a \textit{middle} part in a break sequence for \texttt{bicolor}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'bicolormiddle'

\begin{tcbraster}
\begin{tcolorbox}[skin=bicolormiddle,raster equal height,raster columns=4, colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen, colbacktitle=LimeGreen!75!DarkGreen, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
This is a flavor of \texttt{bicolor} which is used as a \textit{last} part in a break sequence for \texttt{bicolor}. Nevertheless, this skin can be applied independently.

### Environment and engines for the skin `bicolorlast`

<table>
<thead>
<tr>
<th>Engine</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{/tcb/graphical~environment}</td>
<td>105</td>
</tr>
<tr>
<td>\texttt{/tcb/frame~engine}</td>
<td>106</td>
</tr>
<tr>
<td>\texttt{/tcb/interior<del>titled</del>engine}</td>
<td>106</td>
</tr>
<tr>
<td>\texttt{/tcb/interior~engine}</td>
<td>106</td>
</tr>
<tr>
<td>\texttt{/tcb/segmentation~engine}</td>
<td>107</td>
</tr>
<tr>
<td>\texttt{/tcb/title~engine}</td>
<td>107</td>
</tr>
</tbody>
</table>

\begin{tcbraster}[skin=bicolorlast,raster equal height,raster columns=4, colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen, colbacktitle=LimeGreen!75!DarkGreen, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\end{tcbraster}

This is my content. My title

This is my content. My title

More content.
9.15 Skin Family 'beamer'

\tcb/skin=beamer

This skin resembles boxes known from the beamer class and therefore is called 'beamer'. It uses the normal colors from the core package but shades them a little bit. To use this skin, the tikz library shadings has to be included in the preamble by:

\usetikzlibrary{shadings}

The appearance of the skin can be controlled by \texttt{/tcb/frame style} \textsuperscript{P.117} and \texttt{/tcb/interior style} \textsuperscript{P.118}, if needed. Here, the \textit{segmentation} cannot be controlled by a style.

\begin{tcbarray} \begin{tcbraster} \begin{tcolorbox} This is my content. \end{tcolorbox} \begin{tcolorbox} This is my content. \tcblower More content. \end{tcolorbox} \begin{tcolorbox}[adjusted title=My title] This is my content. \end{tcolorbox} \begin{tcolorbox}[adjusted title=My title] This is my content. \tcblower More content. \end{tcolorbox} \end{tcbraster} \end{tcbarray}

This is my content.

This is my content.

My title

My title

This is my content.

This is my content.

My title

My title

This is my content.

This is my content.

My title

My title

This is my content.
This is a flavor of \texttt{beamer} \(^\text{P.187}\) which is used as a \textit{first} part in a break sequence for \texttt{beamer} \(^\text{P.187}\). Nevertheless, this skin can be applied independently.

**Environment and engines for the skin `beamerfirst`**

<table>
<thead>
<tr>
<th>Environment/Engine</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{tcb/graphical environment}</td>
<td>\texttt{tikzpicture}</td>
</tr>
<tr>
<td>\texttt{tcb/frame engine}</td>
<td>\texttt{pathfirst}</td>
</tr>
<tr>
<td>\texttt{tcb/interior titled engine}</td>
<td>\texttt{special}</td>
</tr>
<tr>
<td>\texttt{tcb/interior engine}</td>
<td>\texttt{special}</td>
</tr>
<tr>
<td>\texttt{tcb/segmentation engine}</td>
<td>\texttt{special}</td>
</tr>
<tr>
<td>\texttt{tcb/title engine}</td>
<td>\texttt{pathfirst}</td>
</tr>
</tbody>
</table>

\begin{tcbraster}
[beamer,skin=beamerfirst,raster equal height,raster columns=4,\]
colback=LightGreen,colframe=DarkGreen,\]
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm\]
\end{tcbraster}

\texttt{\begin{tcbraster}\texttt{beamer,skin=beamerfirst,raster equal height,raster columns=4,}}\]
colback=LightGreen,colframe=DarkGreen,\]
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm\]
\texttt{\end{tcbraster}}

This is my content.

This is my content.

tclower

More content.

This is my content.

This is my content.

tclower

More content.

My title

This is my content.

My title

This is my content.

More content.
This is a flavor of beamer\(^{P.187}\) which is used as a \textit{middle} part in a break sequence for beamer\(^{P.187}\). Nevertheless, this skin can be applied independently.

**Environment and engines for the skin `beamermiddle`**

<table>
<thead>
<tr>
<th>Engine</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>/tcb/graphical environment</td>
<td>tikzpicture</td>
</tr>
<tr>
<td>/tcb/frame engine</td>
<td>pathmiddle</td>
</tr>
<tr>
<td>/tcb/interior titled engine</td>
<td>special</td>
</tr>
<tr>
<td>/tcb/interior engine</td>
<td>special</td>
</tr>
<tr>
<td>/tcb/segmentation engine</td>
<td>special</td>
</tr>
<tr>
<td>/tcb/title engine</td>
<td>pathmiddle</td>
</tr>
</tbody>
</table>

\begin{tcbraster}
\begin{tcolorbox}[beamer,skin=beamermiddle,raster equal height,raster columns=4, colback=LightGreen,colframe=DarkGreen, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
This is a flavor of `beamer` which is used as a last part in a break sequence for `beamer`. Nevertheless, this skin can be applied independently.

Environment and engines for the skin ‘`beamerlast`’

```
\begin{tcbraster}[beamer,skin=beamerlast,raster equal height,raster columns=4,
    colback=LightGreen,colframe=DarkGreen,
    left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
```

This is my content.
This is my content.
More content.
This is my content.
This is my content.
More content.
9.16 Skin Family ‘widget’

/\texttt{tcb/skin=widget} \texttt{(skin)}

This skin uses the normal colors from the core package but shades them a little bit. To use this skin, the \texttt{tikz} library \texttt{shadings} has to be included in the preamble by:

\begin{verbatim}
\usetikzlibrary{shadings}
\end{verbatim}

The appearance of the skin can be controlled by /\texttt{tcb/frame style} \texttt{\ \ P.117}, /\texttt{tcb/interior style} \texttt{\ \ P.118}, and /\texttt{tcb/segmentation style} \texttt{\ \ P.120}, if needed.

\begin{center}
\begin{tabular}{|c|c|}
\hline
\texttt{Environment and engines for the skin ‘widget’} & \\
\hline
/\texttt{tcb/graphical environment} & \texttt{tikzpicture} \\
/\texttt{tcb/frame engine} & \texttt{path} \\
/\texttt{tcb/interior titled engine} & \texttt{path} \\
/\texttt{tcb/interior engine} & \texttt{path} \\
/\texttt{tcb/segmentation engine} & \texttt{special} \\
/\texttt{tcb/title engine} & \texttt{special} \\
\hline
\end{tabular}
\end{center}

/\texttt{tcb/widget} \texttt{(style, no value)}

This is an abbreviation for setting \texttt{skin=widget}.

\begin{verbatim}
\begin{tcbraster}
[widget,raster equal height,raster columns=4, 
colback=LightGreen,colframe=DarkGreen, 
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content. 
\end{tcolorbox}
\begin{tcolorbox}
This is my content. \tcblower More content. 
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content. 
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title] 
\tcblower More content. 
\end{tcolorbox}
\end{tcbraster}
\end{verbatim}

This is my content. \hspace{1cm} This is my content. \hspace{1cm} My title \hspace{1cm} My title

This is my content. \hspace{1cm} This is my content. \hspace{1cm} This is my content. \hspace{1cm} This is my content.

More content. \hspace{1cm} More content. \hspace{1cm} My title \hspace{1cm} My title

More content. 

192
A colored box with the 'widget' skin

This is my content.

This is a flavor of \texttt{widget} which is used as a first part in a break sequence for \texttt{widget}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'widgetfirst'

\begin{tabular}{|c|}
\hline
\texttt{/tcb/graphical environment} & \texttt{tikzpicture} \\
\hline
\texttt{/tcb/frame engine} & \texttt{pathfirst} \\
\hline
\texttt{/tcb/interior titled engine} & \texttt{pathfirst} \\
\hline
\texttt{/tcb/interior engine} & \texttt{pathfirst} \\
\hline
\texttt{/tcb/segregation engine} & \texttt{special} \\
\hline
\texttt{/tcb/title engine} & \texttt{special} \\
\hline
\end{tabular}

\begin{tcbraster}
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
This is a flavor of \texttt{widget} which is used as a \textit{middle} part in a break sequence for \texttt{widget}. Nevertheless, this skin can be applied independently.

<table>
<thead>
<tr>
<th>Environment and engines for the skin '\texttt{widgetmiddle}'</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{/tcb/}graphical environment \textsuperscript{P.105}</td>
</tr>
<tr>
<td>\texttt{/tcb/frame engine} \textsuperscript{P.106}</td>
</tr>
<tr>
<td>\texttt{/tcb/interior titled engine} \textsuperscript{P.106}</td>
</tr>
<tr>
<td>\texttt{/tcb/interior engine} \textsuperscript{P.107}</td>
</tr>
<tr>
<td>\texttt{/tcb/segmentation engine} \textsuperscript{P.107}</td>
</tr>
<tr>
<td>\texttt{/tcb/title engine} \textsuperscript{P.107}</td>
</tr>
</tbody>
</table>

This is my content.

\begin{tcbraster}[widget,skin=widgetmiddle,raster equal height,raster columns=4, colback=LightGreen,colframe=DarkGreen, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
tcblower
More content.
\end{tcolorbox}
\end{tcbraster}

\begin{itemize}
\item This is my content.
\item This is my content.
\item \textbf{My title} This is my content.
\item \textbf{My title} This is my content.
\end{itemize}
This is a flavor of \texttt{widget} \cite{P.192} which is used as a \textit{last} part in a break sequence for \texttt{widget} \cite{P.192}. Nevertheless, this skin can be applied independently.

\begin{tcbarray}[widget,skin=widgetlast,raster equal height,raster columns=4, colback=LightGreen,colframe=DarkGreen, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
  \begin{tcolorbox}
    This is my content.
  \end{tcolorbox}
  \begin{tcolorbox}
    This is my content.
    \tcblower More content.
  \end{tcolorbox}
  \begin{tcolorbox}[adjusted title=My title]
    This is my content.
  \end{tcolorbox}
  \begin{tcolorbox}[adjusted title=My title]
    This is my content.
    \tcblower More content.
  \end{tcolorbox}
\end{tcbarray}

Environment and engines for the skin 'widgetlast'

\begin{itemize}
  \item \texttt{tcb/graphical environment} \cite{P.105}: \texttt{tikzpicture}
  \item \texttt{tcb/frame engine} \cite{P.106}: \texttt{pathlast}
  \item \texttt{tcb/interior titled engine} \cite{P.106}: \texttt{pathlast}
  \item \texttt{tcb/interior engine} \cite{P.107}: \texttt{pathlast}
  \item \texttt{tcb/segmentation engine} \cite{P.107}: \texttt{special}
  \item \texttt{tcb/title engine} \cite{P.107}: \texttt{special}
\end{itemize}
9.17 Skin Family 'empty'

\textit{/tcb/skin=empty} \hspace{1em} (skin)

This skin sets all engines to \textit{empty}, i.e. nothing is drawn at all. Therefore, this skin is a good starting point to create a complete new style by yourself.

<table>
<thead>
<tr>
<th>Environment and engines for the skin 'empty'</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{/tcb/graphical environment} \textsuperscript{P.105}: \textit{tikzpicture}</td>
</tr>
<tr>
<td>\textit{/tcb/frame engine} \textsuperscript{P.106}: \textit{empty}</td>
</tr>
<tr>
<td>\textit{/tcb/interior titled engine} \textsuperscript{P.106}: \textit{empty}</td>
</tr>
<tr>
<td>\textit{/tcb/interior engine} \textsuperscript{P.107}: \textit{empty}</td>
</tr>
<tr>
<td>\textit{/tcb/segmentation engine} \textsuperscript{P.107}: \textit{empty}</td>
</tr>
<tr>
<td>\textit{/tcb/title engine} \textsuperscript{P.107}: \textit{empty}</td>
</tr>
</tbody>
</table>

\textit{/tcb/empty} \hspace{1em} (style, no value)

This is an abbreviation for setting \textit{skin=empty}.

\begin{tcbraster}
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
This style relies on the skin empty. All engines are set to empty and all margins are set to 0pt. In contrast to /tcb/blank, the graphical paths are not constructed with exception of the geometry nodes.

\begin{tcolorbox}[blanker,watermark text=A blank box]
\lipsum[1]
\end{tcolorbox}


% 
\tcbuselibrary{fitting}
\newtcbboxfit{\mybox}{[blanker,width=4cm,height=7cm,top=4pt, watermark text=\#1]}

\begin{tabular}{|c|c|c|}
\hline
A & B & C \\
\hline
\mybox{A}{[\lipsum[1]} & \mybox{B}{[\lipsum[2]} & \mybox{C}{[\lipsum[3]} \\
\hline
\end{tabular}

A & B & C

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
</table>
This is a flavor of \texttt{empty} which is used as a \textit{first} part in a break sequence for \texttt{empty}. Nevertheless, this skin can be applied independently.

### Environment and engines for the skin ‘emptyfirst’

<table>
<thead>
<tr>
<th>Environment/Engine</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>/tcb/graphical environment</td>
<td>\texttt{tikzpicture}</td>
</tr>
<tr>
<td>/tcb/frame engine</td>
<td>\texttt{empty}</td>
</tr>
<tr>
<td>/tcb/interior titled engine</td>
<td>\texttt{empty}</td>
</tr>
<tr>
<td>/tcb/interior engine</td>
<td>\texttt{empty}</td>
</tr>
<tr>
<td>/tcb/segmentation engine</td>
<td>\texttt{empty}</td>
</tr>
<tr>
<td>/tcb/title engine</td>
<td>\texttt{empty}</td>
</tr>
</tbody>
</table>

\begin{tcbraster}[empty,skin=emptyfirst,raster equal height,raster columns=4,\]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
This is a flavor of empty which is used as a middle part in a break sequence for empty. Nevertheless, this skin can be applied independently.

Environmental and engines for the skin ‘emptymiddle’

- **/tcb/graphical environment**: `tikzpicture`
- **/tcb/frame engine**: `empty`
- **/tcb/interior titled engine**: `empty`
- **/tcb/interior engine**: `empty`
- **/tcb/segmentation engine**: `empty`
- **/tcb/title engine**: `empty`
This is a flavor of \texttt{empty} which is used as a last part in a break sequence for \texttt{empty}. Nevertheless, this skin can be applied independently.

### Environment and engines for the skin \texttt{emptylast}

- \texttt{tcb/graphical environment} \texttt{P.105}: \texttt{tikzpicture}
- \texttt{tcb/frame engine} \texttt{P.106}: \texttt{empty}
- \texttt{tcb/interior titled engine} \texttt{P.106}: \texttt{empty}
- \texttt{tcb/interior engine} \texttt{P.107}: \texttt{empty}
- \texttt{tcb/segmentation engine} \texttt{P.107}: \texttt{empty}
- \texttt{tcb/title engine} \texttt{P.107}: \texttt{empty}

\begin{tcbraster}[empty,skin=emptylast,raster equal height,raster columns=4, coltitle=Navy,borderline={2pt}{0pt}{black!10!white}, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}
\end{tcbraster}
This example demonstrates a breakable customized box. Here, we define an environment `freebox`. The first application of `freebox` produces an unbroken `tcolorbox`. The box is drawn by the code given by `/tcb/frame code` and `/tcb/interior code`. The second application of `freebox` is broken into several parts which are drawn by the codes given by `/tcb/skin first is subskin of`, `/tcb/skin middle is subskin of`, and `/tcb/skin last is subskin of`.

```latex
\newtcolorbox{freebox}[1][][empty,breakable,leftrule=5mm,left=2mm, frame style={fill,top color=red!75!black,bottom color=red!75!black,middle color=red}, colback=yellow!50!white, watermark color=red!50!yellow!75!white, watermark text on=unbroken is unbroken box, watermark text on=first is first part, watermark text on=middle is middle part, watermark text on=last is last part,]
\tcbset{coltria/.style={fill=red!15!white}}
\begin{tcolorbox}
\begin{tcbcode}
\path[tcb fill frame] (frame.south west)--(frame.north west)--(frame.north east)--(frame.south east)--cycle;
\path[coltria] ([xshift=2.5mm,yshift=1mm]frame.south west) -- +(120:2mm) -- +(60:2mm) -- cycle;
\path[coltria] ([xshift=2.5mm,yshift=-1mm]frame.north west) -- +(240:2mm) -- +(300:2mm) -- cycle;
\path[coltria] ([xshift=2.5mm,yshift=1mm]frame.south west) -- +(120:2mm) -- +(60:2mm) -- cycle;
\end{tcbcode}
\end{tcolorbox}
```

% code for unbroken boxes:
```
frame code={\path[tcb fill frame] (frame.south west)--(frame.north west)--(frame.north east)--(frame.south east)--cycle; },
interior code={\path[tcb fill interior] (interior.south west)--(interior.north west)--(interior.north east)--(interior.south east)--cycle; },
```

% code for the first part of a break sequence:
```
skin first is subskin of={emptyfirst}{% frame code={\path[tcb fill frame] (frame.south west)--(frame.north west)--(frame.north east)--(frame.south east)--cycle; }, \path[coltria] ([xshift=2.5mm,yshift=1mm]frame.south west) -- +(120:2mm) -- +(60:2mm) -- cycle; },
interior code={\path[tcb fill interior] (interior.south west)--(interior.north west)--(interior.north east)--(interior.south east)--cycle; },
```

% code for the middle part of a break sequence:
```
skin middle is subskin of={emptymiddle}{% frame code={\path[tcb fill frame] (frame.south west)--(frame.north west)--(frame.north east)--(frame.south east)--cycle; \path[coltria] ([xshift=2.5mm,yshift=-1mm]frame.north west) -- +(240:2mm) -- +(300:2mm) -- cycle; \path[coltria] ([xshift=2.5mm,yshift=1mm]frame.south west) -- +(120:2mm) -- +(60:2mm) -- cycle; },
interior code={\path[tcb fill interior] (interior.south west)--(interior.north west)--(interior.north east)--(interior.south east)--cycle; },
```

% code for the last part of a break sequence:
```
skin last is subskin of={emptylast}{% frame code={\path[tcb fill frame] (frame.south west)--(frame.north west)--(frame.north east)--(frame.south east)--cycle; \path[coltria] ([xshift=2.5mm,yshift=-1mm]frame.north west) -- +(240:2mm) -- +(300:2mm) -- cycle; },
interior code={\path[tcb fill interior] (interior.south west)--(interior.north west)--(interior.north east)--(interior.south east)--cycle; },
```
```


9.18 Skin ’spartan’

\texttt{/tcb/skin=spartan} (skin)

This skin is quite... spartan. It supports no rounded corners, no overlays, no shadows, no borderlines, and no finishes. The only exception are underlays. One cannot do very fancy things with this skin, but it compiles very fast. Therefore, the \texttt{spartan} skin is used for the draft mode, see Section 9.11 on page 166. Nevertheless, it can be used as a normal skin.

### Environment and engines for the skin ’spartan’

\begin{tcbraster}
\begin{tcolorbox}[spartan,raster equal height,raster columns=4,
colback=LightGreen,colframe=DarkGreen,colbacktitle=LimeGreen!75!DarkGreen,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm]
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content. \tcblower More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content. \tcblower More content.
\end{tcolorbox}
\end{tcbraster}

\texttt{/tcb/spartan} (style, no value)

This is an abbreviation for setting \texttt{skin=spartan}.

\begin{verbatim}
\begin{tcbraster}{spartan,raster equal height,raster columns=4,  
colback=LightGreen,colframe=DarkGreen,colbacktitle=LimeGreen!75!DarkGreen,  
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content. \tcblower More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content. \tcblower More content.
\end{tcolorbox}
\end{tcbraster}
\end{verbatim}
9.19 Skin ‘draft’

This skin is intended to be used while drafting new geometric settings for a \texttt{tcolorbox}.

Environment and engines for the skin ‘draft’

\begin{itemize}
\item \texttt{/tcb/graphical environment} → P.105: \texttt{tikzpicture}
\item \texttt{/tcb/frame engine} → P.106: \texttt{special}
\item \texttt{/tcb/interior titled engine} → P.106: \texttt{special}
\item \texttt{/tcb/interior engine} → P.107: \texttt{special}
\item \texttt{/tcb/segmentation engine} → P.107: \texttt{path}
\item \texttt{/tcb/title engine} → P.107: \texttt{path}
\end{itemize}

This is an abbreviation for setting \texttt{skin=draft}.

\begin{tcbraster}
\begin{tcolorbox}
This is my content.
\end{tcolorbox}
\begin{tcolorbox}
This is my content. \tcblower More content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}
\begin{tcolorbox}[adjusted title=My title]
This is my content. \tcblower More content.
\end{tcolorbox}
\end{tcbraster}


9.20 Skin Family 'freelance'

This skin family 'freelance' is deprecated with \texttt{tcolorbox} 3.00. It is not longer needed, because \\
\texttt{/tcb/frame code} \textsuperscript{P.109}, \texttt{/tcb/interior code} \textsuperscript{P.110}, \texttt{/tcb/interior titled code} \textsuperscript{P.109}, and \texttt{/tcb/title code} \textsuperscript{P.111} can be applied to every skin now. In this sense, everything has become 'freelance' now.

For users of \texttt{/tcb/freelance}: Old code should continue to work. There may be exceptions for breakable freelance boxes under certain circumstances. For new code, use \texttt{/tcb/empty} \textsuperscript{P.196} or \texttt{/tcb/enhanced} \textsuperscript{P.168} where you would have used \texttt{/tcb/freelance} before.

\texttt{/tcb/skin=freelance} (skin)

This skin gives full freedom for the appearance of the \texttt{tcolorbox}. All drawing engines are set to type 'freelance'; they use the \texttt{tikz} package and compute the \texttt{/tcb/geometry nodes} \textsuperscript{P.108}.

Environment and engines for the skin 'freelance'

\begin{itemize}
  \item \texttt{/tcb/graphical environment} \textsuperscript{P.105}: \texttt{tikzpicture}
  \item \texttt{/tcb/frame engine} \textsuperscript{P.106}: \texttt{freelance}
  \item \texttt{/tcb/interior titled engine} \textsuperscript{P.106}: \texttt{freelance}
  \item \texttt{/tcb/interior engine} \textsuperscript{P.107}: \texttt{freelance}
  \item \texttt{/tcb/segmentation engine} \textsuperscript{P.107}: \texttt{freelance}
  \item \texttt{/tcb/title engine} \textsuperscript{P.107}: \texttt{freelance}
\end{itemize}

\texttt{/tcb/freelance} (style, no value)

This is an abbreviation for setting \texttt{skin=freelance}.

\texttt{/tcb/skin=freelancefirst} (skin)

This skin equals 'freelance' with exception of the break sequence, see Section 15.6 on page 306.

\texttt{/tcb/skin=freelancemiddle} (skin)

This skin equals 'freelance' with exception of the break sequence, see Section 15.6 on page 306.

\texttt{/tcb/skin=freelancelast} (skin)

This skin equals 'freelance' with exception of the break sequence, see Section 15.6 on page 306.

\texttt{/tcb/extend freelance=(options)} (no default, initially empty)

The \texttt{(options)} are added to the skin definition of 'freelance'.

\texttt{/tcb/extend freelancefirst=(options)} (no default, initially empty)

The \texttt{(options)} are added to the skin definition of 'freelancefirst' which is used as first part of the break sequence of 'freelance'. See \texttt{/tcb/skin first is subskin of} \textsuperscript{P.112} for a substitute of this key.

\texttt{/tcb/extend freelancemiddle=(options)} (no default, initially empty)

The \texttt{(options)} are added to the skin definition of 'freelancemiddle' which is used as middle part of the break sequence of 'freelance'. See \texttt{/tcb/skin middle is subskin of} \textsuperscript{P.112} for a substitute of this key.

\texttt{/tcb/extend freelancelast=(options)} (no default, initially empty)

The \texttt{(options)} are added to the skin definition of 'freelancelast' which is used as last part of the break sequence of 'freelance'. See \texttt{/tcb/skin last is subskin of} \textsuperscript{P.112} for a substitute of this key.
10 Inclusion of Boxed Image Files

The \texttt{skins} library adds some commands to conveniently include boxed image files. For the following macros and options, the \texttt{skins} library has to be loaded by a package option or inside the preamble by:

\begin{quote}
\texttt{\tcbuselibrary{skins}}
\end{quote}

See Section 9 on page 117 for the documentation of all other options of the \texttt{skins} library.

10.1 Macros

\texttt{\tcbincludegraphics[(options)]{file name}}

In principle, this macro includes an image file denoted by \texttt{(file name)} using the standard \texttt{\includegraphics} and puts it into a \texttt{tcolorbox} \cite{P.11}. The \texttt{(options)} are \texttt{tcolorbox} keys to set up the colored box. Use \texttt{/tcb/graphics options} \cite{P.212} to specify options for the underlying \texttt{\includegraphics}. Some \texttt{tcolorbox} option keys are automatically set, namely \texttt{/tcb/enhanced} \cite{P.169} and options to center the image inside the box.

The sizing of the included image is done depending on the following:

- If a \texttt{/tcb/width} \cite{P.28} is specified, but no fixed \texttt{/tcb/height} \cite{P.45}, the image is sized to fill the inner width of the box. The height of the box adapts to the image.
- If a fixed \texttt{/tcb/height} \cite{P.45} is specified, the image is sized to fill the fixed inner area of the box.
- If the \texttt{/tcb/capture} \cite{P.85} mode \texttt{/tcb/hbox} \cite{P.85} is specified, the image is sized according to given \texttt{\includegraphics} options only. The box adapts to the image.
The auxiliary macro \texttt{\textbackslash imagename} may be used inside \texttt{\textbackslash tcbincludegraphics} to display the name of the file. \texttt{\textbackslash imagename} is already partially detokenized and is allowed to contain special characters like the underscore. Note that an appropriate font is required to display such characters.

\begin{tcbraster}
[size=fbox,\
  colframe=red!50!black,colback=red!20!black,\
  fonttitle=\textbf{\textit{\textbackslash imagename}},center title,drop fuzzy shadow]
\\texttt{\textbackslash tcbincludegraphics}[title=\texttt{\textbackslash imagename}\{goldshade.png}\]
\\texttt{\textbackslash tcbincludegraphics}[finish={\node[fill=white,fill opacity=0.5,text opacity=1] at (frame.center) {\textbf{\textit{\textbackslash imagename}}};}]{blueshade.png}\n\end{tcbraster}

\texttt{goldshade.png} \hspace{1cm} \texttt{blueshade.png}
This is a generalized version of \texttt{\textbackslash tcbincludenfigures}\footnote{P.209} which allows to include a complete PDF file denoted by \texttt{(file name)}. Every page is boxed into its own \texttt{tcolorbox}\footnote{P.11} customized by the given \texttt{options}. It is reasonable to put a series of boxes inside a \texttt{tcbaster}\footnote{P.224} for alignment. Use \texttt{/tcb/graphics\texttt{ pages}}\footnote{P.212} to use a selection of pages instead of using the whole file. The auxiliary macro \texttt{imagepage} may be used inside \texttt{tcbincludenfigure} to display the current page number.

\begin{tcbaster}[raster columns=3,colframe=blue,colback=white, colbacktitle=blue!50!white,fonttitle=\texttt{small bfseries ttfamily}, left=0pt,right=0pt,top=0pt,bottom=0pt,boxsep=0pt,boxrule=0.6pt, toptitle=1mm,bottomtitle=1mm,drop lifted shadow,center title, graphics pages={1,...,6},title={\texttt{\ imagename}} [{\texttt{imagepage}}]}
\tcbincludenfigure{tcolorbox-example.pdf}
\end{tcbaster}
10.2 Option Keys

/tcb/graphics options\{options\}  
(no default, initially empty)

Used for \tcbincludegraphics\(^{P.209}\) and \tcbincludepdf\(^{P.211}\) to specify \includegraphics\{options\}.

\begin{tcbraster}\[
\text{\tcbincludegraphics\{goldshade.png\}}
\text{\tcbincludegraphics\{goldshade.png\}}
\text{\tcbincludegraphics\{goldshade.png\}}
\end{tcbraster}

/tcb/graphics directory\{directory\}  
(no default, initially empty)

Used for \tcbincludegraphics\(^{P.209}\) and \tcbincludepdf\(^{P.211}\) to specify a file system \{directory\} where the image files are located.

\begin{tcbset}\{
 graphics directory={.},
 graphics directory={examples},
 graphics directory={../../../pictures},
\}

The \texttt{graphicspath} macro from the \texttt{graphics} package is superior to this option. \texttt{/tcb/graphics directory} may be used especially for \texttt{/tcbincludepdf}\(^{P.211}\).

/tcb/graphics pages\{selection\}  
(no default, initially 1,\ldots, pdfpages)

Used for \texttt{/tcbincludepdf}\(^{P.211}\) to specify a \{selection\} of pages to be included. The largest page number is accessible by \texttt{pdfpages}. The \{selection\} has to be given using the \texttt{foreach} syntax of \texttt{Ti\kern-0.1667em\texttt{K}Z}.

\begin{tcbset}\{
 graphics pages={1,3,7},
 graphics pages={1,\ldots,10},
 graphics pages={1,3,\ldots,18},
 graphics pages={100,\ldots,\texttt{pdfpages}},
\}
11 TikZ Image and Picture Fill Extensions; Auxiliary Macros

The \texttt{skins} library adds some image and picture fill options to the vast option set of TikZ [20]. These options can be used in any \texttt{tikzpicture}. For the following options, the \texttt{skins} library has to be loaded by a package option or inside the preamble by:

\begin{tcbuselibrary}{skins}

See Section 9 on page 117 for the documentation of all other options of the \texttt{skins} library.

11.1 Fill Plain

\texttt{/tikz/fill plain image}=(\textit{file name}) (no default, initially unset)

Fills the current path with an external image referenced by \textit{file name}. The image is put in the center of the path, but it is not resized to fit into the path area.

\begin{tcbuselibrary}{skins}
\begin{tikzpicture}
\path [draw, fill plain image=goldshade.png]
(2.75,\small -0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
\end{tcbuselibrary}{skins}

\texttt{/tikz/fill plain image**}=(\textit{file name}) (no default, initially unset)

Fills the current path with an external image referenced by \textit{file name}. The image is put in the center of the path, but it is not resized to fit into the path area. The \textit{graphics options} are given to the underlying \texttt{\includegraphics} command.

\begin{tcbuselibrary}{skins}
\begin{tikzpicture}
\path [draw, fill plain image**={width=2.5cm}]
(2.75,\small -0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
\end{tcbuselibrary}{skins}

\texttt{/tikz/fill plain picture}=(\textit{graphical code}) (no default, initially unset)

Fills the current path with the given \textit{graphical code}. The result is put in the center of the path, but it is not resized to fit into the path area. Note that this is almost identical to the standard path \texttt{picture} option.

\begin{tcbuselibrary}{skins}
\begin{tikzpicture}
\path [draw, fill plain picture={%}
\draw[red!50!yellow,line width=2mm]
(0,0) circle (1cm);
\draw[red,line width=5mm] (-1,-1) -- (1,1);
\draw[red,line width=5mm] (-1,1) -- (1,-1);]
(2.75,\small -0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
\end{tcbuselibrary}{skins}
11.2 Fill Stretch

`tikz/fill stretch image=⟨file name⟩` (no default, initially unset)
Fills the current path with an external image referenced by ⟨file name⟩. The image is stretched to fill the path area.

```
\begin{tikzpicture}
\path[fill stretch image=goldshade.png]
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

`tikz/fill stretch image*=⟨graphics options⟩{⟨file name⟩}` (no default, initially unset)
Fills the current path with an external image referenced by ⟨file name⟩. The ⟨graphics options⟩ are given to the underlying \includegraphics command. The image is stretched to fill the path area.

```
\begin{tikzpicture}
\path[fill stretch image*=
{angle=90,origin=c}{goldshade.png}]
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

`tikz/fill stretch picture=⟨graphical code⟩` (no default, initially unset)
Fills the current path with the given ⟨graphical code⟩. The result is stretched to fill the path area.

```
\begin{tikzpicture}
\path[fill stretch picture=%
\draw[red!50!yellow,line width=2mm]
(0,0) circle (1cm);
\draw[red,line width=5mm] (-1,-1) -- (1,1);
\draw[red,line width=5mm] (-1,1) -- (1,-1);
}
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```
11.3 Fill Overzoom

\texttt{/tikz/fill overzoom image=⟨file name⟩} (no default, initially unset)
Fills the current path with an external image referenced by \texttt{⟨file name⟩}. The image is zoomed such that the path area fills the image.

\begin{tikzpicture}
\path[fill overzoom image=goldshade.png]
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\texttt{/tikz/fill overzoom image*=⟨⟨graphics options⟩⟩{⟨file name⟩}} (no default, initially unset)
Fills the current path with an external image referenced by \texttt{⟨file name⟩}. The \texttt{⟨graphics options⟩} are given to the underlying \texttt{\includegraphics} command. The image is zoomed such that the path area fills the image.

\begin{tikzpicture}
\path[fill overzoom image*=angle=90,origin=c,goldshade.png]
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\texttt{/tikz/fill overzoom picture=⟨graphical code⟩} (no default, initially unset)
Fills the current path with the given \texttt{⟨graphical code⟩}. The result is zoomed such that the path area fills the image.

\begin{tikzpicture}
\path[draw,fill overzoom picture=%]
\draw[red!50!yellow,line width=2mm](0,0) circle (1cm);
\draw[red,line width=5mm](-1,-1) -- (1,1);
\draw[red,line width=5mm](-1,1) -- (1,-1);
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
11.4 Fill Zoom

\tikz/fill zoom image=(\textit{file name}) \hspace{1em} (no default, initially unset)

Fills the current path with an external image referenced by \textit{(file name)}. The image is zoomed such that it fits inside the path area. Typically, some parts of the path area will stay unfilled.

\begin{tikzpicture}
\path[draw,fill zoom image=goldshade.png]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
  { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\tikz/fill zoom image*=\{\textit{\textit{graphics options}}\}\{\textit{\textit{file name}}\} \hspace{1em} (no default, initially unset)

Fills the current path with an external image referenced by \textit{(file name)}. The \textit{(graphics options)} are given to the underlying \texttt{\includegraphics} command. The image is zoomed such that it fits inside the path area. Typically, some parts of the path area will stay unfilled.

\begin{tikzpicture}
\path[draw,fill zoom image*=\{angle=90,origin=c\}\{goldshade.png\}]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
  { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\tikz/fill zoom picture=(\textit{graphical code}) \hspace{1em} (no default, initially unset)

Fills the current path with the given \textit{(graphical code)}. The result is zoomed such that it fits inside the path area. Typically, some parts of the path area will stay unfilled.

\begin{tikzpicture}
\path[draw,fill zoom picture={%}
  \draw[red!50!yellow,line width=2mm]
    (0,0) circle (1cm);
  \draw[red,line width=5mm] (-1,-1) -- (1,1);
  \draw[red,line width=5mm] (-1,1) -- (1,-1);
}]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
  { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
11.5 Fill Shrink

\begin{tikzpicture}
\path[draw,fill shrink image=goldshade.png]
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\begin{tikzpicture}
\path[draw,fill shrink*={width=1.5cm}{goldshade.png}]
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\begin{tikzpicture}
\path[draw,fill shrink picture={
% \draw[red!50!yellow,line width=2mm]
(0,0) circle (1cm);
\draw[red,line width=5mm] (-1,-1) -- (1,1);
\draw[red,line width=5mm] (-1,1) -- (1,-1);
}]
(2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315}
{ -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
11.6 Fill Tile

\texttt{/tikz/fill tile image=(file name)} \hspace{1cm} (no default, initially unset)
Fills the current path with a tile pattern using an external image referenced by \texttt{(file name)}.

\begin{tikzpicture}
\path[fill tile image=pink_marble.png] (2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315} { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\texttt{/tikz/fill tile image*=\{graphics options\}-(file name)} \hspace{1cm} (no default, initially unset)
Fills the current path with a tile pattern using an external image referenced by \texttt{(file name)}. The \texttt{graphics options} are given to the underlying \texttt{\includegraphics} command.

\begin{tikzpicture}
\path[fill tile image*=\{width=1cm\}pimp_marble.png] (2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315} { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\texttt{/tikz/fill tile picture=(graphical code)} \hspace{1cm} (no default, initially unset)
Fills the current path with a tile pattern using the given \texttt{graphical code}.

\begin{tikzpicture}
\path[draw,fill tile picture={\%\draw[red!50!yellow,line width=2mm]
(0,0) circle (1cm);
\draw[red,line width=5mm] (-1,-1) -- (1,1);
\draw[red,line width=5mm] (-1,1) -- (1,-1);
}] (2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315} { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}

\texttt{/tikz/fill tile picture*=\{\textit{\texttt{fraction}}}\{\textit{\texttt{graphical code}}\}} \hspace{1cm} (no default, initially unset)
Fills the current path with a tile pattern using the given \texttt{graphical code}. The graphic is resized by \texttt{\textit{\texttt{fraction}}}.

\begin{tikzpicture}
\path[draw,fill tile picture*=\{0.25}\{\%\draw[red!50!yellow,line width=2mm]
(0,0) circle (1cm);
\draw[red,line width=5mm] (-1,-1) -- (1,1);
\draw[red,line width=5mm] (-1,1) -- (1,-1);
}] (2.75,-0.75) -- (3,0) -- (2.75,0.75)
\foreach \w in {45,90,...,315} { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
### 11.7 Filling Options

**/tikz/fill image opacity=(fraction)**

(no default, initially 1.0)

Sets the fill opacity for the image or picture fill options to the given `<fraction>`.

```
\begin{tikzpicture}
\path[fill stretch image=goldshade.png] (0,0) circle (1cm);
\path[fill=red,fill stretch image=goldshade.png,fill image opacity=0.75] (2,0) circle (1cm);
\path[fill=red,fill stretch image=goldshade.png,fill image opacity=0.5] (4,0) circle (1cm);
\path[fill=red,fill stretch image=goldshade.png,fill image opacity=0.25] (6,0) circle (1cm);
\path[fill=red] (8,0) circle (1cm);
\end{tikzpicture}
```

**/tikz/fill image scale=(fraction)**

(no default, initially 1.0)

Stretches, zooms, overzooms or shrinks the image or picture to the given `<fraction>` of the width and height of the current path.

```
\begin{tikzpicture}
\path[draw,fill zoom image=goldshade.png] (0,0) rectangle +(2,2);
\path[draw,fill zoom image=goldshade.png,fill image scale=0.75] (3,0) rectangle +(2,2);
\path[draw,fill zoom image=goldshade.png,fill image scale=1.5] (6,0) rectangle +(2,2);
\end{tikzpicture}
```

**/tikz/fill image options=(graphics options)**

(no default, initially empty)

The `<graphics options>` are given to the underlying `\includegraphics` command for the image fill options. This can be just together with `/tikz/fill stretch image`\textsuperscript{P.214}, `/tikz/fill overzoom image`\textsuperscript{P.215}, `/tikz/fill zoom image`\textsuperscript{P.216}, and `/tikz/fill tile image`\textsuperscript{P.218}.

```
\begin{tikzpicture}
\path[fill image options={width=1cm}, fill tile image=pink_marble.png] (2.75,-0.75) -- (3,0) -- (2.75,0.75) -- cycle;
\end{tikzpicture}
```
\begin{tikzpicture}
  \node[fill stretch image=blueshade.png] (A) at (120:3cm) {A};
  \node[fill stretch image=goldshade.png] (B) at (60:3cm) {B};
  \node[preaction={fill stretch image=blueshade.png},
          fill stretch image=goldshade.png,
          fill image opacity=0.5] (C) {C};
  \path (A) -- node{$+$} (B);
  \draw[->,very thick] (A)--(C);
  \draw[->,very thick] (B)--(C);
\end{tikzpicture}
11.8 Extracting Node Dimensions

The following auxiliary macros are defined by the \texttt{skins} library. They allow to determine the width and height of an arbitrary Ti\textit{k}Z node. To be more specific, they determine the east-to-west and the north-to-south dimensions which may be not the maximal dimensions for a non-rectangular node.

\begin{tikzpicture}
\node[align=center,draw=red,fill=yellow] (A) {This is my\example node};
\tcbsetmacrotowidthofnode\mywidth{A}
\tcbsetmacrotoheightofnode\myheight{A}
\path[draw=blue,fill=blue!25!white] ([xshift=2mm]A.south east) rectangle node{Copy} +(\mywidth,\myheight);
\end{tikzpicture}

This is my\example node Copy
The library is loaded by a package option or inside the preamble by:

```
\usepackage{raster}
```

### 12.1 Concept of Rasters

A *raster* is used to align several colored boxes in a regular way. It can be seen as a far related counterpart to the *matrix* construct of \texttt{Ti\textregistered kZ}, but it differs in many aspects.

In principle, \texttt{tcolorbox}es are arranged in rows and columns when put inside a \texttt{tcbraster}\textsuperscript{P.224} environment. The boxes are fluently added to the raster like adding text to a paragraph. Especially, line/row breaks are done automatically and one cannot end a line/row ahead of schedule. Further, a *raster* is not restricted to a single page but may break into an arbitrary series of pages.


Nine Boxes.

12.2 Macros of the Library

A raster arranges enclosed boxes in a regular way, mainly into rows and columns. The \{options\} are used to control the raster parameters and to set the properties for the enclosed boxes.

- The raster is only allowed to contain a series of \tcolorbox environments or derived constructs. With some small restrictions, boxes created with \tcboxfit can also be added. Boxes created with \tcbox are not reasonable here, but may be used to a certain degree.
- Do not add anything else between the boxes inside the raster with exception of whitespace. Especially, do not use \textbackslash{} or \texttt{par} to end a row; row breaks are done automatically.
- The boxes inside a raster are numbered automatically. \texttt{\thetcbrasternum} may be used inside a box to access this number.

\begin{tcbraster}[raster columns=3, raster equal height, size=small,colframe=red!50!black,colback=red!10!white,colbacktitle=red!50!white, title={Box \#: \thetcbrasternum}]
\begin{tcolorbox}First box\end{tcolorbox}
\begin{tcolorbox}Second box\end{tcolorbox}
\begin{tcolorbox}This is a box with a second line\end{tcolorbox}
\begin{tcolorbox}Another box\end{tcolorbox}
\begin{tcolorbox}A box again\end{tcolorbox}
\end{tcbraster}

Box # 1
First box

Box # 2
Second box

Box # 3
This is a box with a second line

Box # 4
Another box

Box # 5
A box again

\begin{tcbraster}[raster columns=2, raster equal height=rows, size=small,colframe=red!50!black,colback=red!10!white,colbacktitle=red!50!white, title={Box \#: \thetcbrasternum}]
\begin{tcolorbox}First box\end{tcolorbox}
\begin{tcolorbox}Second box\end{tcolorbox}
\begin{tcolorbox}This is a box with a second line\end{tcolorbox}
\begin{tcolorbox}Another box\end{tcolorbox}
\begin{tcolorbox}A box again\end{tcolorbox}
\end{tcbraster}

Box # 1
First box

Box # 2
Second box

Box # 3
This is a box with a second line

Box # 4
Another box

Box # 5
A box again
This is a special case of a \texttt{tcbraster}\textsuperscript{P.224} with the given \texttt{(options)}.

- Here, the enclosed boxes are created using \texttt{tcbitem}.
- There has to be at least one \texttt{tcbitem}.
- One cannot use anything else than \texttt{tcbitem} to add something to the \textit{raster}.

This leads to a very compact syntax.

\begin{tcbitemize}[raster columns=2, raster equal height=rows, size=small,colframe=red!50!black,colback=red!10!white,colbacktitle=red!50!white, title={Box \textsuperscript{\#} \texttt{tcbrasternum}}]
  \tcbitem First box
  \tcbitem Second box
  \tcbitem This is a box\textbackslash with a second line
  \tcbitem[colback=yellow,colbacktitle=yellow!50!black] Another box
  \tcbitem A box again
\end{tcbitemize}

\begin{tcbitemize}
\begin{tcbitemize}[raster columns=2, raster equal height=rows, size=small,colframe=red!50!black,colback=red!10!white,colbacktitle=red!50!white, title={Box \textsuperscript{\#} \texttt{tcbrasternum}}]
  \tcbitem First box
  \tcbitem Second box
  \tcbitem This is a box\textbackslash with a second line
  \tcbitem[colback=yellow,colbacktitle=yellow!50!black] Another box
  \tcbitem A box again
\end{tcbitemize}
\end{tcbitemize}

\texttt{tcbitemize} has more restrictions than \texttt{tcbraster}\textsuperscript{P.224}. Especially, the \texttt{/tcb/capture}\textsuperscript{P.85} mode has to be \texttt{minipage}. For example, \texttt{/tcb/fit}\textsuperscript{P.317} cannot be used safely. If \texttt{/tcb/fit}\textsuperscript{P.317} should be used, turn over to \texttt{tcbraster}\textsuperscript{P.224}.

\texttt{tcbitemize} has more restrictions than \texttt{tcbraster}\textsuperscript{P.224}. Especially, the \texttt{/tcb/capture}\textsuperscript{P.85} mode has to be \texttt{minipage}. For example, \texttt{/tcb/fit}\textsuperscript{P.317} cannot be used safely. If \texttt{/tcb/fit}\textsuperscript{P.317} should be used, turn over to \texttt{tcbraster}\textsuperscript{P.224}.
12.3 Option Keys of the Library

\begin{tcbitemize}[raster columns=3, size=small,colframe=red!50!black, colback=red!10!white]
\item One \item Two \item Three \item Four
\end{tcbitemize}

\begin{tcbitemize}[raster columns=4, size=small,colframe=blue!50!black, colback=blue!10!white]
\item One \item Two \item Three \item Four
\end{tcbitemize}

\begin{tcbitemize}[raster width=\linewidth/2, size=small, colframe=red!50!black, colback=red!10!white]
\item One \item Two \item Three \item Four
\end{tcbitemize}

\texttt{\textbackslash \texttt{tcb/raster columns=\langle number \rangle}} \hspace{1em} (no default, initially 2)

Sets the \langle number \rangle of columns for a \textit{raster}.

\texttt{\textbackslash \texttt{tcb/raster rows=\langle number \rangle}} \hspace{1em} (no default, initially 2)

Sets the \langle number \rangle of rows for a \textit{raster}. Note that this is only relevant in connection with setting \texttt{\textbackslash \texttt{tcb/raster height}} to a value greater than 0pt. Then, it defines the number of rows per given height.

\texttt{\textbackslash \texttt{tcb/raster width=\langle length \rangle}} \hspace{1em} (no default, initially \texttt{\textbackslash linewidth})

Sets the total raster width to the given \langle length \rangle. \texttt{\textbackslash \texttt{tcb/raster left skip}} and \texttt{\textbackslash \texttt{tcb/raster right skip}} are part of the total width.
/tcb/raster height=(length)  
Sets the raster height per /tcb/raster rows\(^{-P.226}\) to the given \(\langle length\rangle\). This forces an appropriate height for the enclosed boxes. /tcb/raster before skip and /tcb/raster after skip are not part of this calculation. If the \(\langle length\rangle\) is set to 0pt, this feature is deactivated.

\begin{tcbitemize}[raster height=4cm, raster rows=2,  
size=small,colframe=red!50!black,colback=red!10!white]  
\tcbitem One  
\tcbitem Two  
\tcbitem[enhanced,  
finish={\draw[blue,very thick,<->] (frame.south)  
-- node[right,pos=.75]{4cm} +(0,4); }] Three  
\tcbitem Four  
\tcbitem Five  
\end{tcbitemize}

/tcb/raster before skip=(glue)  
(no default, initially 2mm)
Space of the given \(\langle glue\rangle\) is inserted vertically before the raster. This space is discardable.

/tcb/raster after skip=(glue)  
(no default, initially 2mm)
Space of the given \(\langle glue\rangle\) is inserted vertically after the raster. This space is discardable.

/tcb/raster equal skip=(length)  
(style, no default)
Shortcut to set /tcb/raster before skip, /tcb/raster after skip, /tcb/raster column skip\(^{-P.228}\), and /tcb/raster row skip\(^{-P.228}\) to the same \(\langle length\rangle\) value.

\begin{tcbitemize}[raster equal skip=4mm,  
size=small,colframe=red!50!black,colback=red!10!white]  
\tcbitem One  
\tcbitem Two  
\tcbitem Three  
\tcbitem Four  
\end{tcbitemize}
Space of the given \textit{length} is inserted horizontally left of the \textit{raster}.

```latex
\begin{tcbitemize}[raster left skip=2cm,
  size=small,colframe=red!50!black,colback=red!10!white]
  \tcitem One
  \tcitem Two
  \tcitem Three
  \tcitem Four
\end{tcbitemize}
```

Space of the given \textit{length} is inserted horizontally right of the \textit{raster}.

```latex
\begin{tcbitemize}[raster right skip=2cm,
  size=small,colframe=red!50!black,colback=red!10!white]
  \tcitem One
  \tcitem Two
  \tcitem Three
  \tcitem Four
\end{tcbitemize}
```

Space of the given \textit{length} is inserted horizontally between the columns.

```latex
\begin{tcbitemize}[raster column skip=2cm,
  size=small,colframe=red!50!black,colback=red!10!white]
  \tcitem One
  \tcitem Two
  \tcitem Three
  \tcitem Four
\end{tcbitemize}
```

Space of the given \textit{length} is inserted vertically between the rows.

```latex
\begin{tcbitemize}[raster row skip=0pt,
  size=small,colframe=red!50!black,colback=red!10!white]
  \tcitem One
  \tcitem Two
  \tcitem Three
  \tcitem Four
\end{tcbitemize}
```
/tcb/raster halign\(=\langle\text{alignment}\rangle\) (no default, initially left)
Defines the horizontal alignment for the boxes of the rows of a raster, if these rows are not completely filled (mainly: the last one).
Feasible values for \(\langle\text{alignment}\rangle\) are:
- left: align to the left side,
- center: align to the center,
- right: align to the right side.

\begin{tcbitemize}[/tcb/raster halign=center, size=small,colframe=red!50!black,colback=red!10!white]
\tcbitem One
\tcbitem Two
\tcbitem Three
\end{tcbitemize}

One Two Three

/tcb/raster valign\(=\langle\text{alignment}\rangle\) (no default, initially center)
Defines the vertical alignment for the boxes of a row, if the boxes do not have equal height.
This sets the /tcb/box align\(\rightarrow P.73\) option.
Feasible values for \(\langle\text{alignment}\rangle\) are:
- top: align to the top side,
- center: align to the center,
- bottom: align to the bottom side.

\begin{tcbitemize}[raster valign=top, raster columns=3, size=small,colframe=red!50!black,colback=red!10!white]
\tcbitem \Huge One
\tcbitem \Large Two
\tcbitem Three
\end{tcbitemize}

\begin{tcbitemize}[raster valign=center, raster columns=3, size=small,colframe=blue!50!black,colback=blue!10!white]
\tcbitem \Huge One
\tcbitem \Large Two
\tcbitem Three
\end{tcbitemize}

\begin{tcbitemize}[raster valign=bottom, raster columns=3, size=small,colframe=green!50!black,colback=green!10!white]
\tcbitem \Huge One
\tcbitem \Large Two
\tcbitem Three
\end{tcbitemize}
/tcb/raster equal height=(type)  (default all, initially none)
Puts the enclosed boxes into a common /tcb/equal height group \(^{P.50}\). The \(<id>\) of the equal height group is chosen automatically, but it may be set manually by /tcb/raster equal height group.
Feasible values for \(<type>\) are:

- **none**: no equal height setting,
- **rows**: all boxes in a row are set to equal height,
- **all**: all boxes in the raster are set to equal height.

Note that you have to compile twice to see changes.

\begin{tcbitemize}[raster equal height=rows,
  size=small,colframe=red!50!black,colback=red!10!white]
  \tcbitem One
  \tcbitem Huge Two
  \tcbitem Three
  \tcbitem Four
\end{tcbitemize}

\begin{tcbitemize}[raster equal height,
  size=small,colframe=red!50!black,colback=red!10!white]
  \tcbitem One
  \tcbitem Huge Two
  \tcbitem Three
  \tcbitem Four
\end{tcbitemize}

/tcb/raster equal height group=(id)  (no default)
Overwrites the automatically chosen id with the given \(<id>\). If this is used to share a common height between the raster and another raster or box, the /tcb/raster equal height option should be set to all.

\begin{tcolorbox}[equal height group=raster-manual-id]
  A single box
\end{tcolorbox}

\begin{tcbitemize}[raster equal height,raster equal height group=raster-manual-id]
  \tcbitem One
  \tcbitem Huge Two
\end{tcbitemize}
\begin{tcbitemize} [raster force size=false, raster halign=center, size=small,colframe=red!50!black,colback=red!10!white]
\tcitem One
\tcitem Two
\tcitem[add to width=-3cm] Three
\tcitem[add to width=-3cm] Four
\tcitem[add to width=-3cm] Five
\tcitem[add to width=3cm] Six
\end{tcbitemize}

\begin{tcbitemize} [size=small,colframe=red!50!black,colback=red!10!white, raster odd column/.style={colframe=blue!50!black,colback=blue!10!white}]
\tcitem One
\tcitem Two
\tcitem Three
\tcitem Four
\end{tcbitemize}

\begin{tcbitemize} [raster even column/.style={colframe=blue!50!black,colback=blue!10!white}]
\tcitem One
\tcitem Two
\tcitem Three
\tcitem Four
\end{tcbitemize}

\begin{tcbitemize} [raster column n]
\tcitem One
\tcitem Two
\tcitem Three
\tcitem Four
\end{tcbitemize}

N 2014-11-10 \texttt{/tcb/raster force size=\texttt{true}|false}\ (default \texttt{true}, initially \texttt{true})

Enforces the raster size computations onto the enclosed boxes. If set to \texttt{false}, individual settings can be used (for the better or worse).

\texttt{/tcb/raster reset}\ (no value)

Sets all raster settings back to their default values. Note that \texttt{/tcb/reset}\ P.90 does not execute this option. Style settings like \texttt{/tcb/raster odd column} etc. are not touched by \texttt{/tcb/raster reset}.

12.4 Adding Styles for Specific Boxes

The following styles can be defined to address certain boxes inside a \textit{raster}. Note that such style definitions are not removed by \texttt{/tcb/reset}\ P.90 or \texttt{/tcb/raster reset}. The style definitions are used in the order given below.

N 2014-11-24 \texttt{/tcb/raster every box}\ (style)

This style is used for every box.

N 2014-11-10 \texttt{/tcb/raster odd column}\ (style)

This style is used for every box in an odd column.

N 2014-11-10 \texttt{/tcb/raster even column}\ (style)

This style is used for every box in an even column.

N 2014-11-10 \texttt{/tcb/raster column n}\ (style)

This style is used for every box in the \texttt{n}-th column. \texttt{n} has to be replaced by a number.

N 2014-11-10 \texttt{/tcb/raster odd row}\ (style)

This style is used for every box in an odd row.
This style is used for every box in an even row.

\begin{tcbitemize}
[size=small,colframe=red!50!black,colback=red!10!white,
  raster row 2/.style={colframe=blue!50!black,colback=blue!10!white}]
  \tcbitem One
  \tcbitem Two
  \tcbitem Three
  \tcbitem Four
\end{tcbitemize}

This style is used for every box in the \( m \)-th row. \( m \) has to be replaced by a number.

```
\begin{tcbitemize}
[size=small,colframe=red!50!black,colback=red!10!white,
  raster row \( m \)/.style={colframe=blue!50!black,colback=blue!10!white}]
  \tcbitem One
  \tcbitem Two
  \tcbitem Three
  \tcbitem Four
\end{tcbitemize}
```

This style is used for every box with an odd number.

\begin{tcbitemize}
[size=small,colframe=red!50!black,colback=red!10!white,
  raster odd number/.style={colframe=blue!50!black,colback=blue!10!white}]
  \tcbitem One
  \tcbitem Two
  \tcbitem Three
  \tcbitem Four
\end{tcbitemize}

This style is used for every box with an even number.

\begin{tcbitemize}
[size=small,colframe=red!50!black,colback=red!10!white,
  raster even number/.style={colframe=blue!50!black,colback=blue!10!white}]
  \tcbitem One
  \tcbitem Two
  \tcbitem Three
  \tcbitem Four
  \tcbitem Five
  \tcbitem Six
\end{tcbitemize}

This style is used for the box in the \( m \)-th row and \( n \)-th column. \( m \) and \( n \) have to be replaced by numbers.

\begin{tcbitemize}
[size=small,colframe=red!50!black,colback=red!10!white,
  raster row \( m \) column \( n \)/.style={colframe=blue!50!black,colback=blue!10!white}]
  \tcbitem One
  \tcbitem Two
  \tcbitem Three
  \tcbitem Four
  \tcbitem Five
  \tcbitem Six
\end{tcbitemize}

This style is used for the box with number \( n \). \( n \) has to be replaced by a number.

\begin{tcbitemize}
[size=small,colframe=red!50!black,colback=red!10!white,
  raster number \( n \)/.style={colframe=blue!50!black,colback=blue!10!white}]
  \tcbitem One
  \tcbitem Two
  \tcbitem Three
  \tcbitem Four
\end{tcbitemize}
13 Libraries \texttt{listings}, \texttt{listingsutf8}, and \texttt{minted}

13.1 Loading the Libraries

In contrast to other \texttt{tcolorbox} libraries, the libraries \texttt{listings}, \texttt{listingsutf8}, and \texttt{minted} are concurrent in the sense that they all do the same thing, i.e. displaying listings with or without typesetting the listing in \LaTeX parallel. The difference is the underlying \LaTeX package which does the core job for displaying a listing. So, typically, you need just one of these libraries. If you do not have a clue, which one of them you should use, you should take \texttt{listingsutf8}.

The order in which the libraries are included influences the default settings and the \texttt{/tcb/reset} behavior. The settings of a later loaded library overwrite the settings of a previous loaded library. A library is never loaded twice.

13.1.1 Loading \texttt{listings}

This library uses the package \texttt{listings} \cite{lst:LaTeX:} to typeset listings. It is loaded by a package option or inside the preamble by:

\begin{verbatim}
\tcbuselibrary{listings}
\end{verbatim}

This also loads the package \texttt{listings} \cite{lst:LaTeX:}.

The \texttt{/tcb/listing engine} \cite{lst:LaTeX:} is set to \texttt{listings} by the library. To reactivate this setting, if overwritten by other libraries, use

\begin{verbatim}
\tcbs{listing engine=listings}
\end{verbatim}

13.1.2 Loading \texttt{listingsutf8}

To extend \texttt{listings} for UTF-8 encoded sources, you can use the support from the package \texttt{listingsutf8} \cite{lst:LaTeX:} by loading the library variant \texttt{listingsutf8}.

\begin{verbatim}
\tcbuselibrary{listingsutf8}
\tcbs{listing utf8=latin1}% optional; 'latin1' is the default.
\end{verbatim}

This also loads the library \texttt{listings} and the packages \texttt{listings} \cite{lst:LaTeX:} and \texttt{listingsutf8} \cite{lst:LaTeX:}.

The \texttt{/tcb/listing engine} \cite{lst:LaTeX:} is set to \texttt{listings} by the library. To reactivate this setting, if overwritten by other libraries, use

\begin{verbatim}
\tcbs{listing engine=listings}
\end{verbatim}
13.1.3 Loading \texttt{minted}

This library uses the package \texttt{minted} \cite{14} to typeset listings. It is loaded by a package option or inside the preamble by:

\begin{verbatim}
tcbuselibrary{minted}
\end{verbatim}

This also loads the package \texttt{minted} \cite{14}.

The \texttt{minted} package uses the external tool \texttt{Pygments} \cite{12} to apply syntax highlighting. It has to be installed and set up, before the library can be used, see \cite{14} and \cite{12}. The \texttt{tcolorbox} library \texttt{minted} does not work, if the package \texttt{minted} \cite{14} does not work.

The \texttt{/tcb/listing engine} \footnote{P.245} is set to \texttt{minted} by the library. To reactivate this setting, if overwritten by other libraries, use

\begin{verbatim}
tcbset{listing engine=minted}
\end{verbatim}

13.2 Common Macros of the Libraries

\begin{verbatim}
\begin{tcblisting}{⟨options⟩}
⟨environment content⟩
\end{tcblisting}
\end{verbatim}

Creates a colored box based on a \texttt{tcolorbox} \footnote{P.11}. Controlled by the given ⟨options⟩, the environment content is typeset normally and/or as a listing. Furthermore, the ⟨options⟩ control appearance and functions of the \texttt{tcolorbox}. By default, the listing is interpreted as a \LaTeX{} listing.

\begin{verbatim}
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black}
This is a \LaTeX{} example which displays the text as source code and in compiled form.
\end{tcblisting}
\end{verbatim}

This is a \LaTeX{} example which displays the text as source code and in compiled form.
<?xml version="1.0"?>
<project name="Package tcolorbox" default="documentation" basedir=".">
  <description>
    Apache Ant build file (http://ant.apache.org/)
  </description>
</project>

% % This box is as wide as needed (listing only !)
% \tcbuselibrary{skins}
\begin{tcblisting}{colback=green!5!white,colframe=green!50!black,listing only, hbox, enhanced, drop fuzzy shadow, before=\begin{center}, after=\end{center}}
\begin{tikzpicture}
\fill[red] (0,0) rectangle (1,1);
\end{tikzpicture}
\end{tcblisting}
\begin{tcboutputlisting}
(environment content)
\end{tcboutputlisting}

Saves the environment content to a file which is named by the key value of \texttt{listing file}. Later, this file can be loaded by \texttt{tcbinputlisting} or \texttt{tcbuselistingtext} or \texttt{tcbuselistinglisting}.

\begin{tcboutputlisting}
This \texttt{\textbf{\texttt{\texttt{text}}} is written to a standardized file for later usage.
\end{tcboutputlisting}

\texttt{tcbinputlisting\{(options)\}}

Creates a colored boxed based on a \texttt{tcolorbox}. The text content is read from a file named by the key value of \texttt{listing file}. Apart from that, the function is equal to that of \texttt{tcblisting} \textsuperscript{P.234}.

\begin{tcbinputlisting}
\texttt{(colback=red!5!white,colframe=red!75!black,text only)}
\end{tcbinputlisting}
\begin{tcbinputlisting}
\texttt{(colback=green!5,colframe=green!75!black,listing only)}
\end{tcbinputlisting}

\begin{tikzpicture}
\fill[red] (0,0) rectangle (1,1);
\end{tikzpicture}

\texttt{tcbuselistingtext}

Loads text from a file named by the key value of \texttt{listing file}.

\begin{tcbuselistingtext}
\end{tcbuselistingtext}

\texttt{tcbuselistinglisting}

Typesets text as listing from a file named by the key value of \texttt{listing file}.

\begin{tcbuselistinglisting}
\begin{tikzpicture}
\fill[red] (0,0) rectangle (1,1);
\end{tikzpicture}
\end{tcbuselistinglisting}

\texttt{tcbusetemplisting}

Typesets text as listing from a temporary file which was written by \texttt{tcbwritetemp} \textsuperscript{P.98}.

\begin{tcbusetemplisting}
\end{tcbusetemplisting}

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See Section 18.4 on page 344 and Section 18.5 on page 346 for more elaborate methods to create new environments and commands.

If a new sort of \texttt{tcblisting} environments should be created with one optional argument only, one is highly recommended to use \texttt{\textbackslash\DeclareTCBListing}\textsuperscript{P.344} or \texttt{\textbackslash\NewTCBListing}\textsuperscript{P.344} instead of \texttt{\textbackslash\newtcblisting} to avoid content scanning problems.

\texttt{\newtcblisting\{\texttt{init options}\}\{\texttt{name}\}\{\texttt{number}\}\{\texttt{default}\}\{\texttt{options}\}}

Creates a new environment \langle \texttt{name} \rangle based on \texttt{tcblisting}\textsuperscript{P.234}. Basically, \texttt{\newtcblisting} operates like \texttt{\newenvironment}. This means, the new environment \langle \texttt{name} \rangle optionally takes \langle \texttt{number} \rangle arguments, where \langle \texttt{default} \rangle is the default value for the optional first argument. The \langle \texttt{options} \rangle are given to the underlying \texttt{tcblisting}. Note that \texttt{/tcb/savedelimiter}\textsuperscript{P.24} is set to the given \langle \texttt{name} \rangle automatically. The \langle \texttt{init options} \rangle allow setting up automatic numbering, see Section 5 from page 92.

\begin{verbatim}
\newtcblisting{mybox}{\%
  colback=red!5!white,
  colframe=red!75!black}
\begin{mybox}
This is my \LaTeX\ box.
\end{mybox}
\end{verbatim}

\begin{verbatim}
\newtcblisting{mybox}[1]{\%
  colback=red!5!white,
  colframe=red!75!black,
  fonttitle=\bfseries,
  title=#1}
\begin{mybox}{Listing Box}
This is my \LaTeX\ box.
\end{mybox}
\end{verbatim}

\begin{verbatim}
\newtcblisting{mybox}[2][]{\%
  colback=red!5!white,
  colframe=red!75!black,
  fonttitle=\bfseries,
  title=#2,\#1}
\begin{mybox}[listing only]
{Listing Box}
This is my \LaTeX\ box.
\end{mybox}
\bigskip
\begin{mybox}[listing side text]
{Listing Box}
This is my \LaTeX\ box.
\end{mybox}
\end{verbatim}
\textbf{Definition in the preamble:}
\begin{mycbox}{Listing Box}
This is my \LaTeX\ box.
\end{mycbox}

\texttt{\renewtcblisting} \begin{init options}\end{init options}\begin{name}\end{name}\begin{number}\end{number}\begin{default}\end{default}\begin{options}\end{options}

Operates like \texttt{\newtcblisting} \textsuperscript{P. 237}, but based on \texttt{\renewenvironment} instead of \texttt{\newenvironment}. An existing environment is redefined.
\newtcbinputlisting[(init options)]{\langle name\rangle}{\langle number\rangle}{\langle default\rangle}{\langle options\rangle}

Creates a new macro \langle name\rangle based on \tcbinputlisting. \footnote{P. 236}. Basically, \newtcbinputlisting operates like \newcommand. The new macro \langle name\rangle optionally takes \langle number\rangle arguments, where \langle default\rangle is the default value for the optional first argument. The \langle options\rangle are given to the underlying \tcbinputlisting. The \langle init options\rangle allow setting up automatic numbering, see Section 5 from page 92.

\newtcbinputlisting[use counter from=mycbox]{\mylisting}[2][%
  listing file={#2},
  title=Listing (\thetcbcounter) of \texttt{#2},
  colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,
  listing only,breakable,#1]

\mylisting[before upper=\textit{This is the included file content:}]
{\jobname.tcbtemp}

\renewtcbinputlisting[(init options)]{\langle name\rangle}{\langle number\rangle}{\langle default\rangle}{\langle options\rangle}

Operates like \newtcbinputlisting, but based on \renewcommand instead of \newcommand. An existing macro is redefined.
13.3 Option Keys of the listings Library

/tcb/listing options=(key list) (no default, initially style=tcblatex)
Sets the options from the package listings [6] which are used during typesetting of the
listing. For \LaTeX\ listings, there is a predefined listings style named tcblatex which
can be used.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!25,left=6mm,
listing options={style=tcblatex,numbers=left,numberstyle=\tiny\color{red!75!black}}}
This is a \LaTeX\ example which displays the text as source code
and in compiled form. Additionally, we use line numbers here.
\end{tcblisting}
```

```
1 This is a \LaTeX\ example which displays the text as source code
2 and in compiled form. Additionally, we use line numbers here.
```

/tcb/no listing options (no value, initially unset)
Abbreviation for listing options={}. This removes all options for the listings package.
This includes the tcblisting standard style tcblatex and the encoding presets. Use this
option, if you want to set the listings options outside of tcblisting, e.g. globally in the
preamble.

```
\begin{tcblisting}{no listing options}
All \textit{listings} options removed.
\end{tcblisting}
```

All \textit{listings} options removed.

All listings options removed.

/tcb/listing style=(style) (no default, initially tcblatex)
Abbreviation for listing options={style=...}. This key sets a (style) for the listings
package, see [6]. For \LaTeX, there is a predefined style named tcblatex.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,
listing style=tcblatex}
Here, we use the predefined style.
\end{tcblisting}
```

Here, we use the predefined style.

Here, we use the predefined style.
/tcb/listing inputencoding=(encoding) (no default, initially \inputencodingname)

Sets the input encoding value for the predefined listing style tcblatex and tcbdocumentation from the library \document. The initial value is derived from the package inputenc if used.

/tcb/listing remove caption=true|false (default true, initially true)

If set to true, some part of the caption building code of the listings package is silenced to prevent some unwanted interaction with the hyperref package resulting in additional vertical space. If set to false, the listings package code is kept unchanged. Note that listings outside tcblisting ^P.234 and \tcbinputlisting ^P.236 are always processed normally. Typically, a user is not expected to use this key at all.

/tcb/every listing line=(text) (no default, initially unset/empty)

Inserts some (text) to the begin of every line of a listing. Note that this a hack of the listings package code. This may become unusuable or superfluous in the future.

\newtcblisting{commandshell}{colback=black,colupper=white,colframe=yellow!75!black,
listing only,listing options={style=tcblatex,language=sh},
every listing line={\textcolor{red}{\small	tfamily\bfseries root \$> }}}

\begin{commandshell}
ls -al
\textcolor{red}{\small	tfamily\bfseries root \$> cd /usr/lib}
\end{commandshell}

See further options in Section 13.6 on page 245.

For an combined example of using \lstinline inside a tcolorbox, see \DeclareTotalTCBox ^P.342.
13.4 Option Keys of the \texttt{listingsutf8} Library

The \texttt{listingsutf8} library is an extension of the \texttt{listings} library, so all options from Section 13.3 on page 240 are applicable.

\texttt{/tcb/listing utf8=(one-byte-encoding)} (style, no default, initially latin1)

Abbreviation for using \texttt{/tcb/listing inputencoding} \(^{P.241}\) together with UTF-8 support from the package \texttt{listingsutf8} [10]. This option is available only for the library variant \texttt{listingsutf8}. The \texttt{(one-byte-encoding)} is one of the applicable encodings from [10], e.g. latin1.

See further options in Section 13.6 on page 245.
13.5 Option Keys of the \texttt{minted} Library

\texttt{/tcb/minted language=(programming language)} (no default, initially \texttt{latex})

Sets a \texttt{(programming language)} known to Pygments \cite{12}.

\begin{tcblisting}{listing engine=minted,minted style=trac,\begin{verbatim}minted language=java,\end{verbatim}colback=red!5!white,colframe=red!75!black,listing only}public class HelloWorld {
  // A 'Hello World' in Java
  public static void main(String[] args) {
    System.out.println("Hello World!");
  }
}
\end{tcblisting}

\texttt{/tcb/minted options=\{key list\}} (no default, initially \texttt{tabsize=2,fontsize=\small})

Sets the options from the package \texttt{minted} \cite{14} which are used during typesetting of the listing.

\begin{verbatim}
\begin{myjava}{listing engine=minted,minted style=colorful,\begin{verbatim}minted language=java,minted options=fontsize=\small,linenos,numbersep=3mm,\end{verbatim}colback=blue!5!white,colframe=blue!75!black,listing only,\begin{verbatim}left=5mm,enhanced,\end{verbatim}overlay={\begin{tcbclipinterior}\fill[red!20!blue!20!white] (frame.south west) rectangle ([xshift=5mm]frame.north west);\end{tcbclipinterior}}}

public class HelloWorld {
  // A 'Hello World' in Java
  public static void main(String[] args) {
    System.out.println("Hello World!");
  }
}
\end{myjava}
\end{verbatim}

% \tcbuselibrary{skins}
\newtcblisting{myjava}{listing engine=minted,minted style=colorful,\begin{verbatim}minted language=java,minted options=fontsize=\small,linenos,numbersep=3mm,\end{verbatim}colback=blue!5!white,colframe=blue!75!black,listing only,\begin{verbatim}left=5mm,enhanced,\end{verbatim}overlay={\begin{verbatim}\begin{tcbclipinterior}\fill[red!20!blue!20!white] (frame.south west) rectangle ([xshift=5mm]frame.north west);\end{tcbclipinterior}}}

\begin{myjava}
public class HelloWorld {
  // A 'Hello World' in Java
  public static void main(String[] args) {
    System.out.println("Hello World!");
  }
}
\end{myjava}

\begin{verbatim}
\begin{myjava}
public class HelloWorld {
  // A 'Hello World' in Java
  public static void main(String[] args) {
    System.out.println("Hello World!");
  }
\end{myjava}
\end{verbatim}

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/tcb/minted style=(style) (no default, initially unset)

Sets a \langle style⟩ known to Pygments [12]. This is independent from /tcb/minted options^P.243. Note that styles are always applied globally; all following examples will be set in the given \langle style⟩ until a new style is set. Also note that setting \usemintedstyle{⟨style⟩} only once per document is more economic, if all styles in a document are the same. For examples of different styles, see /tcb/minted language^P.243 and /tcb/minted options^P.243.

See further options in Section 13.6 on the following page.
13.6 Common Option Keys of all Libraries

For the \textit{⟨options⟩} in \texttt{tcblisting} \textsuperscript{P. 234} respectively \texttt{tcbinputlisting} \textsuperscript{P. 236} the following \texttt{pgf} keys can be applied. The key tree path /\texttt{tcb}/ is not to be used inside these macros.

\texttt{/tcb/listing\_engine=⟨engine⟩} \hspace{1cm} (no default)

Sets the \textit{⟨engine⟩} which typesets the listings. Feasible values are

- \texttt{listings}, if library \texttt{listings} or \texttt{listingsutf8} is loaded.
- \texttt{minted}, if library \texttt{minted} is loaded.

\texttt{/tcb/listing\_file=⟨file\ name⟩} \hspace{1cm} (no default, initially \texttt{\jobname.listing})

Sets the \textit{⟨file\ name⟩} of the file which is used to save listings.

\texttt{/tcb/listing\_and\_text} \hspace{1cm} (no value, initially set)

Typesets the environment content as listing in the upper part and as compiled text in the lower part.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing\_and\_text}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

This is a \LaTeX\ example.

\texttt{/tcb/text\_and\_listing} \hspace{1cm} (no value)

Typesets the environment content as compiled text in the upper part and as listing in the lower part.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text\_and\_listing}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

This is a \LaTeX\ example.

\texttt{/tcb/listing\_only} \hspace{1cm} (no value)

Typesets the environment content as listing.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing\_only}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.
/tcb/text only

Typesets the environment content as compiled text.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text only}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX example.

/tcb/comment=(text)

(No default, initially empty)

Records a comment with \textit{(text)} as content. The comment is displayed e.g. in conjunction with /tcb/listing and comment \textsuperscript{p.248} and /tcb/comment and listing \textsuperscript{p.248}.

\begin{tcblisting}{comment={This comment is really only a comment},
 colback=red!5!white,colframe=red!75!black}
This is a \textbf{tcolorbox}.
\end{tcblisting}

This is a \textbf{tcolorbox}.

This is a \textbf{tcolorbox}.

/tcb/comment only

(No value)

Typesets the environment content with the comment text.

\begin{tcblisting}{comment only, 
 comment={This is a comment.},
 colback=red!5!white,colframe=red!75!black}
This is a \textbf{tcolorbox}.
\end{tcblisting}

This is a comment.

/tcb/image comment=⟨⟨options⟩⟩⟨⟨filename⟩⟩

(Style, no default, initially unset)

Uses an image denoted by \textit{(filename)} as comment for the listing. The image is included by the standard \texttt{\includegraphics} macro with given \textit{(options)}.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing side comment, 
 image comment={width=2.5cm}{example-image-a.pdf},center lower}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

A
/tcb/tcbimage comment=(filename)

(style, no default, initially unset)

Uses an image denoted by \texttt{(filename)} as \texttt{comment} for the listing. The image is included by the \texttt{tcbincludegraphics} \footnote{P.\,209} macro. The inclusion can be customized by \texttt{/tcb/comment style} \footnote{P.\,248}.

The library \texttt{skins} is needed to apply this option.

\begin{verbatim}
\% \tcbuselibrary{skins}
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing side comment,
  righthand width=3cm,lower separated=false,
  tcbimage comment={example-image-a.pdf},
  comment style={size=fbox,colframe=blue,colback=blue!50,sharp corners,
  drop fuzzy shadow}}
This is a \LaTeX\ example.
\end{tcblisting}
\end{verbatim}

The libraries \texttt{skins} and \texttt{raster} are needed to apply this option.

\begin{verbatim}
\% \tcbuselibrary{skins,raster}
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing and comment,
  righthand width=3cm,lower separated=false,middle=1mm,
  pdf comment={tcolorbox-example.pdf},
  comment style={raster columns=3,graphics pages={1,2,3},
  colframe=blue,drop fuzzy shadow}}
This is a \LaTeX\ example.
\end{tcblisting}
\end{verbatim}

/tcb/pdf comment=(filename)

(style, default listing file, initially unset)

Uses a PDF file denoted by \texttt{(filename)} as \texttt{comment} for the listing. The image is included by \texttt{tcbincludepdf} \footnote{P.\,211} inside a \texttt{tcbraster} \footnote{P.\,224}. The inclusion can be customized by \texttt{/tcb/comment style} \footnote{P.\,248}.

\begin{verbatim}
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing and comment,
  righthand width=3cm,lower separated=false,middle=1mm,
  pdf comment={tcolorbox-example.pdf},
  comment style={raster columns=3,graphics pages={1,2,3},
  colframe=blue,drop fuzzy shadow}}
\end{tcblisting}
\end{verbatim}

This is a \LaTeX\ example.
Sets the PDF file name extension for \texttt{/tcb/pdf comment} \textsuperscript{P.247} to \langle\texttt{extension}\rangle. Note that \langle\texttt{extension}\rangle always overwrites any actual extension given inside \texttt{/tcb/pdf comment} \textsuperscript{P.247}.

Sets the \langle\texttt{options}\rangle for \texttt{/tcb/tcimage comment} \textsuperscript{P.247} and \texttt{/tcb/pdf comment} \textsuperscript{P.247}. These are \texttt{tcolorbox} options to customize the colored box drawn around the image(s), also image options encapsulated by \texttt{/tcb/graphics options} \textsuperscript{P.212}, and \texttt{tcbraster} \textsuperscript{P.224} options for \texttt{/tcb/pdf comment} \textsuperscript{P.247}.

Typesets the environment content as listing in the upper part and a given comment in the lower part.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing and comment,\noindent\texttt{comment=\{This is my comment. It may contain line breaks.\par It can even use the environment content \texttt{\llqq}\texttt{\ignorespaces\tcbuselistingtext\unskip\frqq}}\noindent\texttt{\par}}\noindent\texttt{This is a \LaTeX\ example.}\noindent\texttt{\end{tcblisting}}

This is a \LaTeX\ example.

This is my comment. It may contain line breaks.
It can even use the environment content «This is a \LaTeX\ example.»

Typesets a given comment in the upper part and the environment content as listing in the lower part.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,comment and listing,\noindent\texttt{comment=\{This is my comment.\}}}\noindent\texttt{This is a \LaTeX\ example.}\noindent\texttt{\end{tcblisting}}

This is my comment.

This is a \LaTeX\ example.
/tcb/listing side text
Typesets the environment content side by side as listing in the left (upper) part and as compiled text in the right (lower) part.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing side text}
This is a \LaTeX example.
\end{tcblisting}

This is a \LaTeX example.  
This is a \LaTeX example.

/tcb/text side listing
Typesets the environment content side by side as compiled text in the left (upper) part and as listing in the right (lower) part.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text side listing}
This is a \LaTeX example.
\end{tcblisting}

This is a \LaTeX example.  
This is a \LaTeX example.

/tcb/listing outside text
Typesets the environment content side by side as listing in a tcolorbox and as compiled text outside the box in the right part of the page. Nevertheless, the outside text is treated as lower part of the tcolorbox and can be formatted with all lower part options. The space partitioning is done with the side by side options from Section 4.13, see page 68.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing outside text}
This is a \LaTeX example.
\end{tcblisting}

This is a \LaTeX example.  
This is a \LaTeX example.

/tcb/text outside listing
Typesets the environment content side by side as listing in a tcolorbox and as compiled text outside the box in the left part of the page. Nevertheless, the outside text is treated as lower part of the tcolorbox and can be formatted with all lower part options. The space partitioning is done with the side by side options from Section 4.13, see page 68.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text outside listing}
This is a \LaTeX example.
\end{tcblisting}

This is a \LaTeX example.  
This is a \LaTeX example.
/tcb/listing side comment  (no value)
Typesets the environment content side by side as listing in the left (upper) part and a given comment in the right (lower) part.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing side comment, righthand width=1.5cm,image comment={width=1.5cm}{example-image-a.pdf}}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,comment side listing, lefthand width=1.5cm,image comment={width=1.5cm}{example-image-a.pdf}}
This is a \LaTeX\ example.
\end{tcblisting}

A

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing outside comment, righthand width=1.5cm,image comment={width=1.5cm}{example-image-a.pdf}}
This is a \LaTeX\ example.
\end{tcblisting}

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,comment outside listing, lefthand width=1.5cm,image comment={width=1.5cm}{example-image-a.pdf}}
This is a \LaTeX\ example.
\end{tcblisting}

A

This is a \LaTeX\ example.
Typesets the environment content as listing in a tcolorbox and as compiled text outside and below the box. The outside text is treated as lower part of the tcolorbox and can be formatted with all lower part options. The distance between box and text is controlled by /tcb/middle \[P.35\].

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing above text}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

Widely equal to /tcb/listing above text, but the outside text is not formatted with the lower part options. Also, it is not put into a minipage and it may span several pages. The distance between box and text is controlled by /tcb/after \[P.72\].

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text above listing}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

Typesets the environment content as listing in a tcolorbox and as compiled text outside and above the box. The outside text is treated as lower part of the tcolorbox and can be formatted with all lower part options. The distance between box and text is controlled by /tcb/middle \[P.35\].

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text above listing}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

Widely equal to /tcb/text above listing, but the outside text is not formatted with the lower part options. Also, it is not put into a minipage and it may span several pages. The distance between box and text is controlled by /tcb/before \[P.72\].

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text above listing}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.
/tcb/listing above comment  (no value)
Typesets the environment content as listing in a \texttt{tcolorbox} and a given comment outside and below the box. The outside text is treated as lower part of the \texttt{tcolorbox} and can be formatted with all lower part options. The distance between box and comment is controlled by \texttt{/tcb/middle} \textsuperscript{P.35}.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing above comment,center lower,image comment={width=3cm}{example-image-a.pdf}}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

/tcb/listing above* comment  (no value)
Widely equal to \texttt{/tcb/listing above comment}, but the outside comment is not formatted with the lower part options. Also, it is not put into a minipage and it may span several pages. The distance between box and comment is controlled by \texttt{/tcb/after} \textsuperscript{P.72}.

/tcb/comment above listing  (no value)
Typesets the environment content as listing in a \texttt{tcolorbox} and a given comment outside and above the box. The outside text is treated as lower part of the \texttt{tcolorbox} and can be formatted with all lower part options. The distance between box and comment is controlled by \texttt{/tcb/middle} \textsuperscript{P.35}.

\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,comment above listing,center lower,image comment={width=3cm}{example-image-a.pdf}}
This is a \LaTeX\ example.
\end{tcblisting}

This is a \LaTeX\ example.

/tcb/comment above* listing  (no value)
Widely equal to \texttt{/tcb/comment above listing}, but the outside comment is not formatted with the lower part options. Also, it is not put into a minipage and it may span several pages. The distance between box and comment is controlled by \texttt{/tcb/before} \textsuperscript{P.72}.
13.7 Option Keys for Processing and Full Document Examples

A complete \texttt{\LaTeX} document including \texttt{\documentclass}, \texttt{\begin{document}} and \texttt{\end{document}} cannot be processed directly by \texttt{tcolorbox}. It always has to be compiled separately. There are two methods supported by the package to process and display such a full document example:

- Prepare and compile the example document independent from your main document. The source file and the resulting PDF file can be included into the main document afterwards. This is the most economic way since the example document can be left untouched after the example is complete.

- The other possibility is to compile the example on the fly while the main document is compiled. This way has some charm, because the example can be edited inside the main document. But be aware that the compilation of the example is issued on every run of the main document. Also, there are fewer degrees of freedom how the example is compiled.

For both methods, the resulting example PDF file can be included as a \texttt{/tcb/pdf comment}. P. 247

The following example shows how to apply the first method. There already is a file \texttt{tcolorbox-example.tex} and a PDF file \texttt{tcolorbox-example.pdf}. Both of them are input partly by the following:

```latex
% \tcbuselibrary{breakable,skins,raster}
\tcbinputlisting{
    enhanced jigsaw,breakable,pad at break*=2mm,height fixed for=first and middle,
    lower separated=false,
    leftlower=0pt,rightlower=0pt,middle=0pt,
    colframe=red!50!black,colback=yellow!10!white,
    listing and comment,
    listing file={tcolorbox-example},
    listing options={
        style=tcblatex,texcsstyle={\color{red!70!black},firstline=20,lastline=85},
        after upper={\par\bigskip\texttt{\ldots}\par},
        pdf comment,
        comment style={drop lifted shadow,graphics pages={1,...,4}},
    },
}
```

```latex
\documentclass{article}
\usepackage{tikz,lipsum,lmodern}
\usepackage[most]{tcolorbox}
\begin{document}
\%----------------------------------------------------------
\section{Colored boxes}
\begin{tcolorbox}[colback=red!5!white,colframe=red!75!black]
My box.
\end{tcolorbox}
\begin{tcolorbox}[colback=blue!5!white,colframe=blue!75!black,title=My title]
My box with my title.
\end{tcolorbox}
\begin{tcolorbox}[colback=green!5!white,colframe=green!75!black]
Upper part of my box.
\end{tcolorbox}
\end{document}
```

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\texttt{tcblower}
Lower part of my box.
\end{tcolorbox}

\texttt{\begin{tcolorbox}[colback=yellow!5!white,colframe=yellow!50!black,}
\texttt{colbacktitle=yellow!75!black,title=My title]}
\texttt{I can do this also with a title.}
\texttt{tcblower}
\texttt{Lower part of my box.}
\texttt{\end{tcolorbox}}

\texttt{\begin{tcolorbox}[colback=yellow!10!white,colframe=red!75!black,lowerbox=invisible,}
\texttt{savelowerto=\jobname_ex.tex]}
\texttt{Now, we play hide and seek. Where is the lower part?}
\texttt{tcblower}
\texttt{I'm invisible until you find me.}
\texttt{\end{tcolorbox}}

\texttt{\begin{tcolorbox}[colback=yellow!10!white,colframe=red!75!black,title=Here I am]}
\texttt{\input{\jobname_ex.tex}}
\texttt{\end{tcolorbox}}

\texttt{\begin{tcolorbox}[enhanced,sharp corners=uphill,}
\texttt{colback=blue!50!white,colframe=blue!25!black,coltext=yellow,}
\texttt{fontupper=\Large\bfseries,arc=6mm,boxrule=2mm,boxsep=5mm,}
\texttt{borderline={0.3mm}{0.3mm}{white}]}
\texttt{Funny settings.}
\texttt{\end{tcolorbox}}

\texttt{\begin{tcolorbox}[enhanced,frame style image=blueshade.png,}
\texttt{opacityback=0.75,opacitybacktitle=0.25,}
\texttt{colback=blue!5!white,colframe=blue!75!black,}
\texttt{title=My title]}
\texttt{This box is filled with an external image.\par}
\texttt{Title and interior are made partly transparent to show the image.}
\texttt{\end{tcolorbox}}

\texttt{\begin{tcolorbox}[enhanced,attach boxed title to top}
\texttt{center={yshift=-3mm,yshifttext=-1mm},}
\texttt{colback=blue!5!white,colframe=blue!75!black,colbacktitle=red!80!black,}
\texttt{title=My title,fontttitle=\bfseries,}
\texttt{boxed title style={size=small,colframe=red!50!black} ]}
\texttt{This box uses a \texttt{\textit{boxed title}}. The box of the title can}
\texttt{be formatted independently from the main box.}
\texttt{\end{tcolorbox}}

...
4 Watermarks

5 Boxes in boxes

6 Breakable Boxes

/tcb/no process

Removes all processing commands if set before.

/tcb/process code=*<code>*

(no default, initially empty)

Adds <code>, which is executed during \texttt{\texttt{tcbinputlisting}}\textsuperscript{\texttt{P.236}} and \texttt{tcblisting}\textsuperscript{\texttt{P.234}}. At the time of executing the given <code>, the listing is already written to \texttt{/tcb/listing file}\textsuperscript{\texttt{P.245}}, but the colored box is not constructed yet. Its intended use is to process the listing somehow before displaying. The processing result can be used inside a \texttt{/tcb/comment}\textsuperscript{\texttt{P.246}}. Several /tcb/process code options can be given which are processed in the given order.

To use the further options, the compiler has to be called with the \texttt{-shell-escape} permission to authorize potentially dangerous system calls. Be warned that this is a security risk. Anyway, it’s more economic to compile examples independent from the main document and to include them as shown in the previous pages.

/tcb/run system command=*<system command>*

(style, no default, initially unset)

Runs a <system command>, if the document is compiled with the \texttt{-shell-escape} permission. The current listing file can be accessed as \texttt{\jobname}@area\filename@base\filename@ext.

/tcb/compilable listing

(style, no default)

Sets \texttt{/tcb/listing file}\textsuperscript{\texttt{P.245}} to \texttt{\jobname}-listing-<counter>.

The default \texttt{/tcb/listing file}\textsuperscript{\texttt{P.245}} setting cannot be used to compile a listing, since the base name equals the \texttt{\jobname} and the included PDF files should be unique. Therefore, to use \texttt{/tcb/run pdflatex} etc., the \texttt{/tcb/listing file}\textsuperscript{\texttt{P.245}} has to be set to a unique value. One may use \texttt{/tcb/compilable listing} for this purpose.

/tcb/run pdflatex=*<arguments>*

(style, no default, initially unset)

Issues a \texttt{pdflatex} compilation of the listing with the given <arguments>.

- The main document has to be compiled with the \texttt{-shell-escape} permission.
- The \texttt{/tcb/listing file}\textsuperscript{\texttt{P.245}} has to be unique for the listing.
- If the listing has to be compiled twice, add \texttt{run pdflatex} two times to the option list.
\documentclass{beamer}
\usetheme{Warsaw}
\begin{document}
\begin{frame}{Beamer example}
\begin{block}{Hello World}
\begin{itemize}<+->
\item One
\item Two
\end{itemize}
\end{block}
\begin{alertblock}{Integral}
\begin{equation}
\begin{align}
\int_1^x \frac{1}{t} \, dt &= \ln(x). \tag{1}
\end{align}
\end{equation}
\end{alertblock}
\end{frame}
\end{document}
Issues a \texttt{xelatex} compilation of the listing with the given \texttt{⟨arguments⟩}.

Issues a \texttt{lualatex} compilation of the listing with the given \texttt{⟨arguments⟩}.

Issues a \texttt{makeindex} compilation of the listing with the given \texttt{⟨arguments⟩}.

Issues a \texttt{bibtex} compilation of the listing with the given \texttt{⟨arguments⟩}.

Issues a \texttt{biber} compilation of the listing with the given \texttt{⟨arguments⟩}.

Issues an \texttt{arara} compilation of the listing with the given \texttt{⟨arguments⟩}.

Issues a \texttt{latex} compilation of the listing with the given \texttt{⟨arguments⟩}.

Issues a \texttt{dvips} compilation of the listing with the given \texttt{⟨arguments⟩}.

Issues a \texttt{ps2pdf} compilation of the listing with the given \texttt{⟨arguments⟩}.

\begin{tcblisting}{enhanced jigsaw,  
\texttt{⟨arguments⟩}}\title=PSTricks with pdflatex,\fonttitle=\texttt{⟨arguments⟩},\colframe=red!50!black,\colback=yellow!10!white,\listingoptions={\texttt{⟨arguments⟩}},\lower separated=false,\middle=0pt,\listing side comment,\righthand width=4.5cm,\compilable listing,\run latex,\run dvips,\run ps2pdf,\pdf comment,\comment style={\texttt{⟨arguments⟩}},\end{tcblisting}

\begin{document}
\psset{unit=3}
\multido{\nHue=0.01+0.01}{100}{
\definecolor{MyColor}{hsb}{\nHue,1,1}\pscircle[linewidth=0.01,linecolor=MyColor]{\nHue}}
\end{document}

\begin{document}
\psset{unit=3}
\multido{\nHue=0.01+0.01}{100}{
\definecolor{MyColor}{hsb}{\nHue,1,1}\pscircle[linewidth=0.01,linecolor=MyColor]{\nHue}}
\end{document}
13.8 Creation of \LaTeX Tutorials

The following source code gives a guideline for the creation of \LaTeX tutorials. In the next section, a framework for \LaTeX exercises is described. All examples shall be numbered optionally.

Firstly, some additional \texttt{tcb} keys are defined for the appearance. For the examples, three environments \texttt{texexp}, \texttt{texexptitled}, and \texttt{texexptitledspec} are defined with automatic numbering.

- \texttt{texexp} is used for untitled examples,
- \texttt{texexptitled} is used for titled examples,
- \texttt{texexptitledspec} is used for titled examples with special treatment.

\begin{tcblisting}{texexp}
This is a \LaTeX example which displays the text as source code
and in compiled form.
\end{tcblisting}

\begin{tcblisting}{texexptitled}{firstExample}
Here, we use Example \ref{firstExample} with a title line.
\end{tcblisting}

\begin{tcblisting}{texexptitledspec}{firstExample}
Here, we use Example 13.1 with a title line.
\end{tcblisting}

\begin{tcblisting}{texexp}
This is a \LaTeX example which displays the text as source code
and in compiled form.
\end{tcblisting}

\begin{tcblisting}{texexptitled}{firstExample}
Here, we use Example \ref{firstExample} with a title line.
\end{tcblisting}

\begin{tcblisting}{texexptitledspec}{firstExample}
Here, we use Example 13.1 with a title line.
\end{tcblisting}
This is a \LaTeX\ example which displays the text as source code and in compiled form.

This is a \LaTeX\ example which displays the text as source code and in compiled form.

This is a \LaTeX\ example which displays the text as source code and in compiled form.

This is a \LaTeX\ example which displays the text as source code only.

This is a \LaTeX\ example which displays the text in compiled form only.
\begin{texexptitled}{An Example with a Heading}{heading1}
This is a LaTeX example with a numbered heading line which can be referred to.
\end{texexptitled}

Here, we see Example \ref{heading1}.

**Example 13.2: An Example with a Heading**

This is a LaTeX example with a numbered heading line which can be referred to.

This is a \LaTeX example with a numbered heading line which can be referred to.

Here, we see Example 13.2.

\begin{texexptitled}{listing only}{Another Example with a Heading}{heading2}
The keys can be used in combination. Here, an example with a heading line and source code only is given.
\end{texexptitled}

Here, we see Example \ref{heading2}.

**Example 13.3: Another Example with a Heading**

The keys can be used in combination. Here, an example with a heading line and source code only is given.

Here, we see Example 13.3.

\begin{texexptitled}{float}{A floating Example with a Heading}{heading3}
This is another LaTeX example with numbered heading line. But now, the box is a floating object.
\end{texexptitled}

**Example 13.4: A floating Example with a Heading**

This is another \LaTeX example with numbered heading line. But now, the box is a floating object.

This is another \LaTeX example with numbered heading line. But now, the box is a floating object.

The floating box of the last example is seen as Example \ref{heading3} on page \pageref{heading3}.

The floating box of the last example is seen as Example 13.4 on page 261.

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The following series of examples demonstrate the application of `tcolorbox` options for diversification.
Example 13.7: How to use options (2):
The text output is centered and the segmentation line has vanished.

\begin{tikzpicture}
  \path[fill=yellow!50!white] (0,0) circle (11mm);
  \path[fill=white] (0,0) circle (9mm);
  \foreach \w/\c in {90/red,210/green,330/blue}
  \path[shading=ball,ball color=\c] (\w:1cm) circle (7mm);
\end{tikzpicture}

Example 13.8: How to use options (3):
Here, the \texttt{tikzpicture} is totally hidden. The \texttt{bicolor} skin highlights the output.

\begin{tikzpicture}
  \path[fill=yellow!50!white] (0,0) circle (11mm);
  \path[fill=white] (0,0) circle (9mm);
  \foreach \w/\c in {90/red,210/green,330/blue}
  \path[shading=ball,ball color=\c] (\w:1cm) circle (7mm);
\end{tikzpicture}
How to use options (4): The `bicolor` skin also works with side by side mode.

```
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
 (\w:1cm) circle (7mm);}\end{tikzpicture}
```

Example 13.9: How to use options (4):
The `bicolor` skin also works with side by side mode.

```
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
 (\w:1cm) circle (7mm);}\end{tikzpicture}
```

How to use options (5):
Putting our picture outside is just a matter of one word.

```
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
 (\w:1cm) circle (7mm);}\end{tikzpicture}
```

Example 13.10: How to use options (5):
Putting our picture outside is just a matter of one word.

```
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
 (\w:1cm) circle (7mm);}\end{tikzpicture}
```
Example 13.11: How to use options (6):
The picture may also be put above the listing box.
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
\shading{\w:1cm} circle (7mm);}
\end{tikzpicture}

Example 13.12: How to use options (7):
Our style is easily transformed into a beamerish one.
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
\shading{\w:1cm} circle (7mm);}
\end{tikzpicture}
13.9 Creation of \LaTeX\ Exercises

In the following, a guideline is given for the creation of \LaTeX\ exercises with solutions. These solutions are saved to disk for application at a place of choice. Therefore, all used exercises are logged to a file \verb|\jobname.records| for automatic processing. The solution contents themselves are saved to a subdirectory named \verb|solutions|. Also see Section 7 on page 99.

- Before the first exercise is given, \verb|\tcbstartrecording| has to be called to start recording.
- The solution is given as content of a \verb|tcboutputlisting| environment. Note, that you can use this content also inside the exercise with \verb|\tcbuselistingtext| in compiled form.
- After the last exercise is given (and before using the solutions), \verb|\tcbstoprecording| has to be called to stop recording.
- The solutions are loaded by \verb|\tcbinputrecords|.

Inside the exercise text, there may be text parts which are needed as \LaTeX\ source code and as compiled text as well. These parts can be saved by \verb|\tcbwritetemp| and used in compiled form by \verb|\tcbusetemp| or as source code by \verb|\tcbusetemplisting|.

At first, we generate some a common style for the exercises and the solutions. Further, since exercises and solutions should be numbered, we force to use a label \langle\textit{marker}\rangle. Automatically, the label \texttt{exe:}\langle\textit{marker}\rangle is used to mark the exercise and the label \texttt{sol:}\langle\textit{marker}\rangle is used to mark the solution.

\begin{verbatim}
\tcbset{texercisestyle/.style={arc=0.5mm, colframe=blue!25!yellow!90!white, colback=blue!25!yellow!5!white, coltitle=blue!25!yellow!40!black, fonttitle=\small\sffamily\bfseries, fontupper=\small, fontlower=\small, listing options={style=tcblatex, texcsstyle=\color{red!40!black}},}
\end{verbatim}

With these preparations, the kernel environment \verb|texercise| for our exercises is created quickly:

\begin{verbatim}
\newtcolorbox[auto counter, number within=section, list inside=exam]{texercise}[2][]{\%texercisestyle, listing file={solutions/texercise/\thetcbcounter.tex}, label={exe:#2}, record={\string\processsol{solutions/texercise/\thetcbcounter.tex}{#2}}, title={Exercise \thetcbcounter \\textbf{Solution on page \pageref{sol:#2}}}, list text={Exercise with solution on page \pageref{sol:#2}},#1}
\end{verbatim}
The following examples demonstrate the application.

Exercise 13.1

Create the following table:

<table>
<thead>
<tr>
<th>Republik</th>
<th>Kaiserreich</th>
<th>Franken</th>
<th>Teilstaaten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antike</td>
<td>Mittelalter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Solution on page 270
\begin{tcboutputlisting}
\newcommand{\headingline}[1]{\center\Large\bfseries #1}
\end{tcboutputlisting}
\tcbuselistingtext%

Create a new macro \verb+\headingline+ which produces the following output:
\begin{tcbwritetemp}
\headingline{Very important heading}
\end{tcbwritetemp}
\tcbusetemplisting \tcbusetemp

Exercise 13.2

Solution on page 270

Create a new macro \verb+\headingline+ which produces the following output:
\verb+\headingline{Very important heading}+

Very important heading

\begin{tcboutputlisting}
\newcommand{\minitable}[2]{\center\begin{tabular}{p{10cm}}\hline
\multicolumn{1}{c}{\bfseries#1}\\\hline
#2\\\hline
\end{tabular}}
\end{tcboutputlisting}
\tcbuselistingtext%

Create a new macro \verb+\minitable+ which produces the following output:
\begin{tcbwritetemp}
\minitable{My heading}{In this tiny tabular, there is only a heading and some text below which has a width of ten centimeters.}
\end{tcbwritetemp}
\tcbusetemplisting \par \tcbusetemp

Exercise 13.3

Solution on page 270

Create a new macro \verb+\minitable+ which produces the following output:
\verb+\minitable{My heading}{In this tiny tabular, there is only a heading and some text below which has a width of ten centimeters.}+

\textbf{My heading}

In this tiny tabular, there is only a heading and some text below which has a width of ten centimeters.
Exercise 13.4

Create a new macro \verb\synop which typesets a synoptic text according to the following example. Base your macro on a tabular which takes the total line width.

\synop{Neil Armstrong}

(That’s one small step for a man, one giant leap for mankind.)

\synop{Das ist ein kleiner Schritt für einen Mann, ein riesiger Sprung für die Menschheit.}

<table>
<thead>
<tr>
<th>English</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>That’s one small step for a man, one giant leap for mankind.</td>
<td>Das ist ein kleiner Schritt für einen Mann, ein riesiger Sprung für die Menschheit.</td>
</tr>
</tbody>
</table>

Now, we give a list of all exercises with:

13.10 List of Exercises

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Solution on page</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1</td>
<td>270</td>
</tr>
<tr>
<td>13.2</td>
<td>270</td>
</tr>
<tr>
<td>13.3</td>
<td>270</td>
</tr>
<tr>
<td>13.4</td>
<td>271</td>
</tr>
</tbody>
</table>
13.11 Solutions for the given \LaTeX\ Exercises

For all solutions, a macro \texttt{\textbackslash processsol} was written to the file \texttt{\jobname.records}. Now, we need a definition for this macro to use the solutions.

\begin{verbatim}
\% \usepackage{hyperref} \% for phantomlabel
\newtcbinputlisting{\texttt{\textbackslash processsol}[2]}{%
  texercisestyle, 
  listing only, 
  listing file={#1},
  phantomlabel={sol:#2},%
  title={Solution for Exercise \texttt{\ref{exe:#2}} on page \texttt{\pageref{exe:#2}}},
}
\end{verbatim}

The loading of all solutions is done by:

\texttt{\textbackslash tcbinputrecords}

With this, we get:

Solution for Exercise 13.1 on page 267

\begin{verbatim}
\begin{tabular}{|p{3cm}|p{3cm}|p{3cm}|p{3cm}|}
\hline
\multicolumn{4}{|c|}{\bfseries\itshape Das alte Italien}\
\hline
\multicolumn{2}{|c|}{\bfseries Antike} & \multicolumn{2}{c|}{\bfseries Mittelalter}\
\hline
\multicolumn{1}{|c|}{\itshape Republik} & \multicolumn{1}{c|}{\itshape Kaiserreich} & \multicolumn{1}{c|}{\itshape Franken} & \multicolumn{1}{c|}{\itshape Teilstaaten}\
\hline
In den Zeiten der r"{o}mischen Republik standen dem Staat jeweils zwei Konsuln vor, deren Machtbefugnisse identisch waren. & Das r"{o}mische Kaiserreich wurde von einem Alleinherrscher, dem Kaiser, regiert. & In der V"{o}lkerwanderungszeit "{u}bernahmen die Goten und sp"{a}ter die Franken die Vorherrschaft. & Im sp"{a}teren Mittelalter regierten F"{u}rsten einen Fleckenteppich von Einzelstaaten.\
\end{tabular}
\end{verbatim}

Solution for Exercise 13.2 on page 268

\begin{verbatim}
\newcommand{\headingline}[1]{% \begin{center}\Large\bfseries #1\end{center}}
\end{verbatim}

Solution for Exercise 13.3 on page 268

\begin{verbatim}
\newcommand{\minitable}[2]{% \begin{center}\begin{tabular}{p{10cm}}\hline
\multicolumn{1}{c}{\bfseries#1}\
\hline
#2\
\hline
\end{tabular}\end{center}}
\end{verbatim}
\newcommand{\synop}[3]{% 
  \begin{tabular}{@{}p{\linewidth-\tabcolsep*2-\arrayrulewidth}/2|p{\linewidth-\tabcolsep*2-\arrayrulewidth}/2}@{}}\hline 
  \multicolumn{2}{c}{\bfseries #1}\\
  \multicolumn{1}{c|}{\itshape English} & \multicolumn{1}{c}{\itshape German} \\
  \hline 
  #2 & #3 
  \hline 
  \end{tabular}}

<table>
<thead>
<tr>
<th>English</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2</td>
<td>#3</td>
</tr>
</tbody>
</table>
14 Library \textcolor{blue}{theorems}

The library is loaded by a package option or inside the preamble by:

\texttt{\textbackslash\tcbuselibrary\{theorems\}}

This also loads the package \texttt{amsmath}.

14.1 Macros of the Library

\texttt{\textbackslash newtcbtheorem[\{init options\}]\{\{name\}\{\{display name\}\{\{options\}\{\{prefix\}\}

Creates new environments \texttt{\{name\}} and \texttt{\{name\}∗} based on \texttt{tcolorbox} to frame a (mathematical) theorem. The \texttt{\{display name\}} is used in the title line with a number, e.g. «Theorem 5.1». The \texttt{\{options\}} are given to the underlying \texttt{tcolorbox} to control the appearance. The \texttt{\{init options\}} allow setting up automatic numbering, see Section 5 on page 92.

The new environment \texttt{\{name\}} takes one optional and two mandatory parameters. The optional parameter supplements the options and should be used only in rare cases. The first mandatory parameter is the title text for the theorem and the second mandatory parameter is a \texttt{\{marker\}}. The theorem is automatically labeled with \texttt{\{prefix\}:\{marker\}}.

The new environment \texttt{\{name\}∗} takes one optional and one mandatory parameter and represents an unnumbered variant of the environment \texttt{\{name\}}. This variant is not labeled and not listed in lists of theorems.

\texttt{\begin{mytheo}\{This is my title\}\{theoexample\}
This is the text of the theorem. The counter is automatically assigned and, in this example, prefixed with the section number. This theorem is numbered with \texttt{\ref{th:theoexample}} and is given on page \texttt{\pageref{th:theoexample}}.\end{mytheo}}

\texttt{My Theorem 14.1: This is my title
This is the text of the theorem. The counter is automatically assigned and, in this example, prefixed with the section number. This theorem is numbered with 14.1 and is given on page 272.}

\texttt{\begin{mytheo}[label=myownlabel]\{This is my title\}\{}
The label parameter can be left empty without \texttt{\LaTeX} error. Or you may use an own label to reference Theorem \texttt{\ref{myownlabel}}.\end{mytheo}}

\texttt{My Theorem 14.2: This is my title
The label parameter can be left empty without \texttt{\LaTeX} error. Or you may use an own label to reference Theorem 14.2.
\begin{mytheo}{}{}
The title can also be left empty without problem. Note that the ':' vanished magically.
\end{mytheo}

My Theorem 14.3
The title can also be left empty without problem. Note that the ':' vanished magically.

\begin{mytheo*}{Unnumbered Theorem}
This theorem is not numbered.
\end{mytheo*}

My Theorem: Unnumbered Theorem
This theorem is not numbered.

\begin{mytheo*}{}
This theorem has no number and no title.
\end{mytheo*}

My Theorem
This theorem has no number and no title.

\renewtcbtheorem[(init options)]{⟨name⟩}{⟨display name⟩}{⟨options⟩}{⟨prefix⟩}
Operates like \newtcbtheorem P.272, but based on \renewenvironment instead of \newenvironment. An existing environment is redefined.

\tcbmaketheorem{⟨name⟩}{⟨display name⟩}{⟨options⟩}{⟨counter⟩}{⟨prefix⟩}
\newtcbtheorem P.272 supersedes this macro.

Creates a new environment ⟨name⟩ based on tcolorbox to frame a (mathematical) theorem.
The ⟨display name⟩ is used in the title line with a number, e.g. «Theorem 5.1». The ⟨options⟩ are given to the underlying tcolorbox to control the appearance. The ⟨counter⟩ is used for automatic numbering. The new environment ⟨name⟩ takes one optional and two mandatory parameters. The optional parameter supplements the options and should be used only in rare cases. The first mandatory parameter is the title text for the theorem and the second mandatory parameter is a ⟨marker⟩. The theorem is automatically labeled with ⟨prefix⟩:⟨marker⟩.
\texttcbmath[(options)]{(mathematical box content)}

Creates a \texttcb macro which is fitted to the width of the given \texttcbmath. This box is intended to be applied as part of a larger formula and may be used as replacement for the \boxed macro of \texttt{amsmath}.

\begin{equation}
\texttcbset{fonttitle=\scriptsize}
\texttcbmath[\texttt{colback=LightBlue!25!white,colframe=blue}]{a^2 = 16}
\quad \Rightarrow \quad \texttcbmath[\texttt{colback=Salmon!25!white,colframe=red,title=Implication}]{a = 4 \vee a = -4.}
\end{equation}

\texttt{tcbhighmath}[\texttt{(options)}]{(mathematical box content)}

This is a special case of the \texttcbmath macro which uses the style \texttt{/tcb/highlight math}. It is intended to provide context sensitive highlighting of formula parts. The color settings via \texttt{/tcb/highlight math style} may be different inside theorems or other colored areas and outside.

\begin{align}
\texttcbhighmath[\texttt{myformula/.style={colback=yellow!10!white,colframe=red!50!black, every box/.style={highlight math style={colback=LightBlue!50!white,colframe=Navy}}}}]{\sum_{n=1}^{\infty} \frac{1}{n}} &= \infty. \\
\int x^2 \text{d}x &= \frac{1}{3} x^3 + c.
\end{align}

∞ \sum_{n=1}^{\infty} \frac{1}{n} = \infty.

\int x^2 \text{d}x = \frac{1}{3} x^3 + c.

∞ \sum_{n=1}^{\infty} \frac{1}{n} = \infty.

\int x^2 \text{d}x = \frac{1}{3} x^3 + c.
$\texttt{\textbackslash tcbhighmath}$ can be used in symbiosis with the $\texttt{empheq}$ package which allows to specify own boxing commands to mark multiline formulas.

\begin{empheq}[box=\texttt{tcbhighmath}]{align}
a&=\sin(z) \\
E&=mc^2 + \int_a^b x \, dx
\end{empheq}

\begin{empheq}[box=\texttt{tcbhighmath}]{align}
a&=\sin(z) \\
E&=mc^2 + \int_a^b x \, dx
\end{empheq}

Besides $\texttt{\textbackslash tcbhighmath}$, one can easily define an independent new box based on $\texttt{\textbackslash tcbbox}$ which acts like $\texttt{\textbackslash tcbhighmath}$.

\begin{empheq}[box=\texttt{\otherbox}]{align}
a&=\sin(z) \\
E&=mc^2 + \int_a^b x \, dx
\end{empheq}

\begin{empheq}[box=\texttt{\otherbox}]{align}
a&=\sin(z) \\
E&=mc^2 + \int_a^b x \, dx
\end{empheq}

\begin{equation}
\texttt{\textbackslash tcbhighmath}\{E\} = \texttt{\otherbox}\{mc^2\}
\end{equation}

\begin{equation}
E = mc^2
\end{equation}
14.2 Option Keys of the Library

/\texttt{tcb\textbackslash separator sign} \langle \textit{sign} \rangle (no default, initially :)

The given \langle \textit{sign} \rangle is used inside the title text of a theorem as separator between display name combined with number and the specific title text. It is omitted, if there is no specific title text.

\begin{verbatim}
\usepackage{amssymb}
\newtcbtheorem[use counter from=mytheo]{sometheorem}{Theorem}{
{colback=white,colframe=red!50!black,fonttitle=\bfseries,
separator sign={\ $\blacktriangleright$}}}{theo}
\begin{sometheorem}{My example}{}
My theorem text.
\end{sometheorem}
\end{verbatim}

\textbf{Theorem 14.4} \textit{My example} \hfill \textit{My theorem text.}

/\texttt{tcb\textbackslash separator sign colon} (style, no value, initially set)

Sets /\texttt{tcb\textbackslash separator sign} to the default colon : sign.

\begin{verbatim}
\newtcbtheorem[use counter from=mytheo]{sometheorem}{Theorem}{
{colback=white,colframe=red!50!black,fonttitle=\bfseries,
separator sign dash}}{theo}
\begin{sometheorem}{My example}{}
My theorem text.
\end{sometheorem}
\end{verbatim}

\textbf{Theorem 14.5} \textit{My example} \hfill \textit{My theorem text.}

/\texttt{tcb\textbackslash separator sign dash} (style, no value)

Sets /\texttt{tcb\textbackslash separator sign} to an en-dash sign.

\begin{verbatim}
\newtcbtheorem[use counter from=mytheo]{sometheorem}{Theorem}{
{colback=white,colframe=red!50!black,fonttitle=\bfseries,
separator sign none}}{theo}
\begin{sometheorem}{My example}{}
My theorem text.
\end{sometheorem}
\end{verbatim}

\textbf{Theorem 14.6} \textit{My example} \hfill \textit{My theorem text.}

/\texttt{tcb\textbackslash separator sign none} (style, no value)

Sets /\texttt{tcb\textbackslash separator sign} to empty.

\begin{verbatim}
\newtcbtheorem[use counter from=mytheo]{sometheorem}{Theorem}{
{colback=white,colframe=red!50!black,fonttitle=\bfseries,
separator sign none}}{theo}
\begin{sometheorem}{My example}{}
My theorem text.
\end{sometheorem}
\end{verbatim}

\textbf{Theorem 14.6} \textit{My example} \hfill \textit{My theorem text.}
The given \langle left \rangle and \langle right \rangle delimiter signs are used to frame the descriptive title text of a theorem.

Sets /tcb/description delimiters to ( and ).

Sets the \langle color \rangle of the descriptive title text deviating from /tcb/coltitle. The color is reset to /tcb/coltitle, if description color is used without value.
The document discusses the use of \texttt{/tcb/description font} to set the font before the descriptive title text deviating from \texttt{/tcb/fonttitle}. The \texttt{description font} is removed if \texttt{description font} is used without value. It also explains the use of \texttt{/tcb/description formatter} to set the formatter for the descriptive title text. The \texttt{description formatter} is reset to its standard behavior if it is used without value. Finally, it describes the use of \texttt{/tcb/terminator sign} as a terminator at the end of the title text of a theorem.
Sets \texttt{/tcb/terminator sign colon} \textsuperscript{P.278} to the colon : sign.

\begin{tcbtheorem}[use counter from=mytheo]{sometheorem}{Theorem}%
\begin{colback=white, colframe=red!50!black, fonttitle=\bfseries, separator sign dash,terminator sign colon}{theo}
\begin{sometheorem}{My example}{}
My theorem text.
\end{sometheorem}
\end{tcbtheorem}

\textbf{Theorem 14.13 – My example:}
My theorem text.

Sets \texttt{/tcb/terminator sign dash} \textsuperscript{P.278} to an en-dash sign.

\begin{tcbtheorem}[use counter from=mytheo]{sometheorem}{Theorem}%
\begin{colback=white, colframe=red!50!black, fonttitle=\bfseries, terminator sign dash}{theo}
\begin{sometheorem}{My example}{}
My theorem text.
\end{sometheorem}
\end{tcbtheorem}

\textbf{Theorem 14.14: My example –}
My theorem text.

Sets \texttt{/tcb/terminator sign none} \textsuperscript{P.278} to the default empty text.

\texttt{/tcb/theorem name and number} \textsuperscript{(style, no value, initially set)}
Prints theorem name followed by theorem number inside the title.

\begin{tcbtheorem}[use counter from=mytheo]{sometheorem}{Theorem}%
\begin{colback=white, colframe=red!50!black, fonttitle=\bfseries, theorem name and number}{theo}
\begin{sometheorem}{My example}{}
My theorem text.
\end{sometheorem}
\end{tcbtheorem}

\textbf{Theorem 14.15: My example}
My theorem text.
/tcb/theorem number and name (style, no value)

Prints theorem number followed by theorem name inside the title.

\newtcbtheorem [use counter from=mytheo]{sometheorem}{Theorem}{colback=white,colframe=red!50!black,fonttitle=\bfseries,\thetheorem\theo}{\begin{sometheorem}{My example}{My theorem text.\end{sometheorem}}}

14.16 Theorem: My example
My theorem text.

/tcb/theorem name (style, no value)

Prints theorem name without number inside the title.

\newtcbtheorem [use counter from=mytheo]{sometheorem}{Theorem}{colback=white,colframe=red!50!black,fonttitle=\bfseries,\thetheorem\theo\text,enhanced,watermark text={\thetcbcounter}}{\begin{sometheorem}{My example}{My theorem text.\end{sometheorem}}}

Theorem: My example
My theorem text.

/tcb/theorem={⟨display name⟩}{⟨counter⟩}{⟨title⟩}{⟨marker⟩} (no default)

This key is internally used by \tcbmaketheorem \textsuperscript{P.273}, but can be used directly in a \texttt{tcolorbox} for a more flexible approach. The \texttt{⟨display name⟩} is used together with the increased \texttt{⟨counter⟩} value and the \texttt{⟨title⟩} for the title line of the box. Additionally, a \texttt{label} with the given \texttt{⟨marker⟩} is created.

\begin{tcolorbox}[colback=green!10,colframe=green!50!black,arc=4mm,theorem={Test}{texercise}{Direct usage}{myMarker}]
Here, we see the test \ref{myMarker}.
\end{tcolorbox}

Test 1: Direct usage
Here, we see the test 1.

For a common appearance inside the document, the key \texttt{theorem} should not be used directly as in the example above, but as part of a new environment created by hand or using \texttt{\tcbmaketheorem} \textsuperscript{P.273} or using its successor \texttt{\newtcbtheorem} \textsuperscript{P.272}. 280
/tcb/highlight math  \hspace{1em} (style, no value)
   Predefined style which is used for \tcbhighlightmath. It can be changed comfortable with /tcb/highlight math style.

/tcb/highlight math style=(style definition)  \hspace{1em} (style, no default)
   Changes the definition for \tcbhighlightmath to the given \textit{style definition}. See \tcbhighlightmath for another example.

\begin{align*}
\tcbhighlightmath[\text{remember as=fx}]{f(x)} &= \int_{1}^{x} \frac{1}{t^2} \, dt \\
&= \left[ -\frac{1}{t} \right]_{1}^{x} \\
&= -\frac{1}{x} + \frac{1}{1} \\
&= 1 - \frac{1}{x}.
\end{align*}

/tcb/math upper \hspace{1em} (style, no value)
   Sets the upper part to mathematical mode with font \texttt{\textbackslash displaystyle}.

/tcb/math lower \hspace{1em} (style, no value)
   Sets the lower part to mathematical mode with font \texttt{\textbackslash displaystyle}.

/tcb/math \hspace{1em} (style, no value)
   Sets the upper part and lower part to mathematical mode with font \texttt{\textbackslash displaystyle}.

\begin{tcolorbox}
\sum_{n=1}^{\infty} \frac{1}{n} = \infty.
\end{tcolorbox}
The following styles are only tested to work with the original `amsmath` environments. If e.g. the `equation` environment is redefined as `gather`, then `\tcb/ams equation` should / could not be used. Obviously, you are encouraged to use `\tcb/ams gather` in this case.

```
\begin{tcolorbox}[ams equation,colback=yellow!10!white,colframe=red!50!black]
\sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty.
\end{tcolorbox}
```

\[ \sum_{n=1}^{\infty} \frac{1}{n} = \infty. \] (15)

```
\begin{tcolorbox}[ams equation*,colback=yellow!10!white,colframe=red!50!black]
\sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty.
\end{tcolorbox}
```

\[ \sum_{n=1}^{\infty} \frac{1}{n} = \infty. \]
/tcb/ams align upper (style, no value)
Adds an amsmath align environment to the start and end of the upper part.

/tcb/ams align lower (style, no value)
Adds an amsmath align environment to the start and end of the lower part.

/tcb/ams align (style, no value)
Adds an amsmath align environment to the start and end of the upper and lower part.

\begin{tcolorbox}[ams align,colback=yellow!10!white,colframe=red!50!black]
\sum_{n=1}^{\infty} \frac{1}{n} &= \infty. \\
\int x^2 ~{\text{d}}x &= \frac13 x^3 + c.
\end{tcolorbox}

∞ \sum_{n=1}^{n} 1 \infty.
\int x^2 d x = \frac13 x^3 + c.

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/tcb/ams gather upper (style, no value)
Adds an amsmath gather environment to the start and end of the upper part.

/tcb/ams gather lower (style, no value)
Adds an amsmath gather environment to the start and end of the lower part.

/tcb/ams gather (style, no value)
Adds an amsmath gather environment to the start and end of the upper and lower part.

\begin{tcolorbox}[ams gather,colback=yellow!10!white,colframe=red!50!black]
\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \\
\int x^2 \, dx = \frac{1}{3} x^3 + c.
\end{tcolorbox}

\begin{align}
\sum_{n=1}^{\infty} \frac{1}{n} &= \infty. \\
\int x^2 \, dx &= \frac{1}{3} x^3 + c.
\end{align}

/tcb/ams gather* upper (style, no value)
Adds an amsmath gather* environment to the start and end of the upper part.

/tcb/ams gather* lower (style, no value)
Adds an amsmath gather* environment to the start and end of the lower part.

/tcb/ams gather* (style, no value)
Adds an amsmath gather* environment to the start and end of the upper and lower part.

\begin{tcolorbox}[ams gather*,colback=yellow!10!white,colframe=red!50!black]
\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \\
\int x^2 \, dx = \frac{1}{3} x^3 + c.
\end{tcolorbox}

\begin{align}
\sum_{n=1}^{\infty} \frac{1}{n} &= \infty. \\
\int x^2 \, dx &= \frac{1}{3} x^3 + c.
\end{align}
Neutralizes the `\abovedisplayskip` of a following `align` or `gather` environment for the upper part. Note that the text content has to start with such a formula.

Neutralizes the `\abovedisplayskip` of a following `align` or `gather` environment for the lower part. Note that the text content has to start with such a formula.

Neutralizes the `\abovedisplayskip` of a following `align` or `gather` environment for the upper part and lower part. Note that the text content has to start with such a formula.

New colored mathematical environments are easily created using `\newtcolorbox`:

All described options like `\tcbset{ams gather upper}`\textsuperscript{P.284}, `\tcbset{ams gather lower}`\textsuperscript{P.284}, `\tcbset{ams gather}`\textsuperscript{P.284} are (partially) setting (overwriting) the keys `\tcbset{before upper}`\textsuperscript{P.52}, `\tcbset{after upper}`\textsuperscript{P.53}, `\tcbset{before lower}`\textsuperscript{P.53}, `\tcbset{after lower}`\textsuperscript{P.53}.

Therefore, e.g. `\tcbset{ams gather,before upper={\text{Pythagoras:}}}` produces an invalid result. For this case, you are invited to use `\tcbset{ams gather,before upper app={\text{Pythagoras:}}}`, see `\tcbset{ams gather,before upper app}`\textsuperscript{P.327}.
/tcb/theorem style=(name)                      (no default, initially standard)
Applies a predefined style (name) to the theorem environment. Some of the feasible (name) values resemble style names from the packages theorem and ntheorem to give convenient access to known patterns.
The styles alter /tcb/separatoren sign - - P.276, /tcb/description delimiters - - P.277, /tcb/terminator sign - - P.278, and more. Therefore, one should apply such keys after a theorem style.

For the following examples, we use:

\begin{tcbtheorem}[use counter from=mytheo]{theorem}{Theorem}{}
\% fonttitle=bfseries\upshape,fontupper=\itshape, colframe=green!50!black,colback=green!10!white, colbacktitle=green!20!white, coltitle=blue!75!black\{theo\}
\end{tcbtheorem}
The predefined styles are:

- **standard**: This is the initial value.

\begin{tcbtheorem}[use counter from=mytheo]{theorem}{Theorem}{}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{tcbtheorem}

**Theorem 14.18**: standard
This is my theorem.
\[a^2 + b^2 = c^2.\]

- **change standard**

\begin{tcbtheorem}[use counter from=mytheo]{theorem}{Theorem}{}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{tcbtheorem}

**14.19 Theorem**: change standard
This is my theorem.
\[a^2 + b^2 = c^2.\]

- **plain**

\begin{tcbtheorem}[use counter from=mytheo]{theorem}{Theorem}{}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{tcbtheorem}

**Theorem 14.20 (plain)**: This is my theorem.
\[a^2 + b^2 = c^2.\]
• **break**

\begin{theorem}[theorem style=break]\{break\}{}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

**Theorem 14.21 (break):**
This is my theorem.
\[ a^2 + b^2 = c^2. \]

• **plain apart**

\begin{theorem}[theorem style=plain apart]\{plain apart\}{}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

**Theorem 14.22 (plain apart)**
This is my theorem.
\[ a^2 + b^2 = c^2. \]

• **change**

\begin{theorem}[theorem style=change]\{change\}{}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

**14.23 Theorem (change):** This is my theorem.
\[ a^2 + b^2 = c^2. \]

• **change break**

\begin{theorem}[theorem style=change break]\{change break\}{}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

**14.24 Theorem (change break):**
This is my theorem.
\[ a^2 + b^2 = c^2. \]

• **change apart**

\begin{theorem}[theorem style=change apart]\{change apart\}{}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

**14.25 Theorem (change apart)**
This is my theorem.
\[ a^2 + b^2 = c^2. \]
• **margin**

\begin{theorem}[theorem style=margin,left=10mm]{margin}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

14.26 Theorem (margin): This is my theorem.
\[ a^2 + b^2 = c^2. \]

\begin{theorem}[theorem style=margin,oversize]{margin}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

14.27 Theorem (margin): This is my theorem.
\[ a^2 + b^2 = c^2. \]

• **margin break**

\begin{theorem}[theorem style=margin break,left=10mm]{margin break}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

14.28 Theorem (margin break):
This is my theorem.
\[ a^2 + b^2 = c^2. \]

\begin{theorem}[theorem style=margin break,oversize]{margin break}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

14.29 Theorem (margin break):
This is my theorem.
\[ a^2 + b^2 = c^2. \]

• **margin apart**

\begin{theorem}[theorem style=margin apart,left=10mm]{margin apart}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

14.30 Theorem (margin apart)
This is my theorem.
\[ a^2 + b^2 = c^2. \]

\begin{theorem}[theorem style=margin apart,oversize]{margin apart}
This is my theorem. \begin{equation*} a^2 + b^2 = c^2. \end{equation*} \end{theorem}

14.31 Theorem (margin apart)
This is my theorem.
\[ a^2 + b^2 = c^2. \]
14.3 Examples for Definitions and Theorems

In the following, the application of \texttt{tcbmaketheorem} to highlight mathematical definitions, theorems, or the like is demonstrated.

At first, additional \texttt{tcb} keys are created for the appearance of the colored boxes. It is assumed that theorems and corollaries should be identically colored. All following environments are numbered with a common counter, but this can be changed easily. Here, the counter output is supplemented by the subsection number. Further, the \texttt{cleveref} package is used for clever references.

\begin{verbatim}
Definition in the preamble:
% \usepackage{cleveref}
tcbset{
defstyle/.style={fonttitle=\bfseries\upshape, fontupper=\slshape, arc=0mm, colback=blue!5!white,colframe=blue!75!black},
theostyle/.style={fonttitle=\bfseries\upshape, fontupper=\slshape, colback=red!10!white,colframe=red!75!black},
}
\newtcbtheorem[number within=subsection,crefname={definition}{definitions}]% {Definition}{Definition}{defstyle}{def}
\newtcbtheorem[use counter from=Definition,crefname={theorem}{theorems}]% {Theorem}{Theorem}{theostyle}{theo}
\newtcbtheorem[use counter from=Definition,crefname={corollary}{corollaries}]% {Corollary}{Corollary}{theostyle}{cor}
\end{verbatim}

By \texttt{\newtcbtheorem}, commonly numbered theorem environments are created now. \texttt{defstyle} and \texttt{theostyle} are used for the appearance.

Now, everything is prepared for the following examples.

The following theorem is numbered as \texttt{Cref{theo:diffbarstetig}} and referenced with the marker \texttt{theo:diffbarstetig}.

\begin{Theorem}{Differenzierbarkeit bedingt Stetigkeit, wobei diese Benennung zu Testzwecken ungewöhnlich lang ist}{diffbarstetig}
\[
\text{Eine Funktion } f : I \to \mathbb{R} \text{ ist in } x_0 \in I \text{ stetig, wenn } f \text{ in } x_0 \text{ differenzierbar ist.}
\]
\end{Theorem}

The following theorem is numbered as Theorem 14.3.1 and referenced with the marker \texttt{theo:diffbarstetig}.

\begin{Theorem}{Differenzierbarkeit bedingt Stetigkeit, wobei diese Benennung zu Testzwecken ungewöhnlich lang ist}{diffbarstetig}
\[
\text{Eine Funktion } f : I \to \mathbb{R} \text{ ist in } x_0 \in I \text{ stetig, wenn } f \text{ in } x_0 \text{ differenzierbar ist.}
\]
\end{Theorem}
The following definition is numbered as \Cref{def:diffbarkeit} and referenced with the marker \texttt{def:diffbarkeit}.

\begin{Definition}{Differenzierbarkeit}{diffbarkeit}
Eine Funktion $f : I \to \mathbb{R}$ auf einem Intervall $I$ heißt differenzierbar oder linear approximierbar, wenn der Grenzwert
\begin{equation*}
\lim_{x \to x_0} \frac{f(x) - f(x_0)}{x - x_0} = \lim_{h \to 0} \frac{f(x_0 + h) - f(x_0)}{h}
\end{equation*}
existiert. Bei Existenz heißt dieser Grenzwert Ableitung oder Differentialquotient von $f$ in $x_0$ und man schreibt für ihn
\begin{equation*}
f'(x_0) \quad \text{oder} \quad \frac{df}{dx}(x_0).
\end{equation*}
\end{Definition}

The following corollary is numbered as \Cref{cor:nullstellen} and referenced with the marker \texttt{cor:nullstellen}.

\begin{Corollary}{Nullstellenexistenz}{nullstellen}
Ist $f: [a,b] \to \mathbb{R}$ stetig und haben $f(a)$ und $f(b)$ entgegengesetzte Vorzeichen, also $f(a)f(b)<0$, so besitzt $f$ eine Nullstelle $x_0 \in ]a,b[$, also $f(x_0)=0$.
\end{Corollary}

The following corollary is numbered as Corollary 14.3.3 and referenced with the marker \texttt{cor:nullstellen}.

\begin{Corollary}{Nullstellenexistenz}{nullstellen}
Ist $f: [a,b] \to \mathbb{R}$ stetig und haben $f(a)$ und $f(b)$ entgegengesetzte Vorzeichen, also $f(a)f(b)<0$, so besitzt $f$ eine Nullstelle $x_0 \in ]a,b[$, also $f(x_0)=0$.
\end{Corollary}
Hinreichende Bedingung für Wendepunkte

Es sei $f$ eine auf einem Intervall $[a, b]$ dreimal stetig differenzierbare Funktion. Ist $f''(x_0) = 0$ in $x_0 \in [a, b]$ und $f'''(x_0) \neq 0$, so ist $(x_0, f(x_0))$ ein Wendepunkt von $f$. 

Theorem 14.3.4: Hinreichende Bedingung für Wendepunkte

$f$ sei eine auf einem Intervall $[a, b]$ dreimal stetig differenzierbare Funktion. Ist $f''(x_0) = 0$ in $x_0 \in [a, b]$ und $f'''(x_0) \neq 0$, so ist $(x_0, f(x_0))$ ein Wendepunkt von $f$. 

Theorem 14.3.5 (Mittelwertsatz für $n$ Variable)

Es sei $n \in \mathbb{N}$, $D \subseteq \mathbb{R}^n$ eine offene Menge und $f \in C^1(D, \mathbb{R})$. Dann gibt es auf jeder Strecke $[x_0, x] \subset D$ einen Punkt $\xi \in [x_0, x]$, so dass gilt

$$f(x) - f(x_0) = \text{grad} f(\xi)^\top (x - x_0)$$

Here, \texttt{cleveref} support is used to reference Theorem 14.3.5 on Page 291. This theorem can also be referenced by \texttt{\Vref} resulting in Theorem 14.3.5.

Note that \texttt{/tcb/label type} \texttt{P.88} was used in the example above to feed \texttt{cleveref} \texttt{[5]} with the needed name information.
Here, using \ref{Vref} resulting in \ref{theo:meanvaluetheorem} is more interesting dots

Here, using \ref{Vref} resulting in Theorem 14.3.5 on page 291 is more interesting

\begin{varwidth}{\textwidth}
% \usepackage{varwidth} \tcuselibrary{skins}
\newtcbtheorem[use counter from=Definition]{YetAnotherTheorem}{Theorem}[]{
  enhanced,frame empty,interior empty,colframe=ForestGreen!50!white,
  coltitle=ForestGreen!50!black,fonttitle=\bfseries,colbacktitle=ForestGreen!15!white,
  borderline={0.5mm}{0mm}{ForestGreen!15!white},
  borderline={0.5mm}{0mm}{ForestGreen!50!white,dashed},
  attach boxed title to top center={yshift=-2mm},
  boxed title style={boxrule=0.4pt},varwidth boxed title}{theo}
\begin{YetAnotherTheorem}{Mittelwertsatz f"{u}r $n$ Variable}{mittelwertsatz_n3}\%
\begin{equation*}
  f(x) - f(x_0) = \operatorname{grad} f(\xi)^\top(x-x_0)
\end{equation*}
\end{YetAnotherTheorem}
\end{varwidth}

14.3.6 Theorem (Mittelwertsatz für $n$ Variable)

Es sei $n \in \mathbb{N}$, $D \subseteq \mathbb{R}^n$ eine offene Menge und $f \in C^1(D, \mathbb{R})$. Dann gibt es auf jeder Strecke $[x_0, x] \subset D$ einen Punkt $\xi \in [x_0, x]$, so dass gilt

\begin{equation*}
  f(x) - f(x_0) = \operatorname{grad} f(\xi)^\top(x-x_0)
\end{equation*}

\begin{varwidth}{\textwidth}
% \usepackage{varwidth} \tcuselibrary{skins}
\newtcbtheorem[use counter from=Definition]{YetAnotherTheorem}{Theorem}[]{
  enhanced,frame empty,interior empty,colframe=ForestGreen!50!white,
  coltitle=ForestGreen!50!black,fonttitle=\bfseries,colbacktitle=ForestGreen!15!white,
  borderline={0.5mm}{0mm}{ForestGreen!15!white},
  borderline={0.5mm}{0mm}{ForestGreen!50!white,dashed},
  attach boxed title to top center={yshift=-2mm},
  boxed title style={boxrule=0.4pt},varwidth boxed title}{theo}
\begin{YetAnotherTheorem}{Mittelwertsatz f"{u}r $n$ Variable}{mittelwertsatz_n3}\%
\begin{equation*}
  f(x) - f(x_0) = \operatorname{grad} f(\xi)^\top(x-x_0)
\end{equation*}
\end{YetAnotherTheorem}
\end{varwidth}

Theorem 14.3.7: Mittelwertsatz für $n$ Variable

Es sei $n \in \mathbb{N}$, $D \subseteq \mathbb{R}^n$ eine offene Menge und $f \in C^1(D, \mathbb{R})$. Dann gibt es auf jeder Strecke $[x_0, x] \subset D$ einen Punkt $\xi \in [x_0, x]$, so dass gilt

\begin{equation*}
  f(x) - f(x_0) = \operatorname{grad} f(\xi)^\top(x-x_0)
\end{equation*}
You need more attention for your theorems? Here, you are . . .

Let's try a more conservative approach:

Theorem 14.3.9 (Mittelwertsatz für n Variable): Es sei \( n \in \mathbb{N} \), \( D \subseteq \mathbb{R}^n \) eine offene Menge und \( f \in C^1(D, \mathbb{R}) \). Dann gibt es auf jeder Strecke \([x_0, x] \subseteq D\) einen Punkt \( \xi \in [x_0, x] \), so dass gilt

\[
 f(x) - f(x_0) = \nabla f(\xi)^\top (x - x_0)
\]
14.4 Using other theorem environments with \texttt{tcolorbox}

Instead of creating theorem environments with the methods described before, environments from other packages can be boxed with a \texttt{tcolorbox}.

Environments may be created e.g. by methods from the \texttt{theorem} package or the \texttt{amsthm} package. \texttt{\tcolorboxenvironment} can be used to put a box around these environments.

\texttt{\begin{lem}
\lipsum[2]
\end{lem}}

\texttt{\begin{proof}
\lipsum*[4]
\end{proof}}


The library is loaded by a package option or inside the preamble by:

```
\tcbuselibrary{breakable}
```

### 15.1 Technical Overview

The library supports the automatic breaking of a `tcolorbox`. This feature is enabled by `/tcb/breakable` and disabled by `/tcb/unbreakable`.

If a `tcolorbox` is set to be `/tcb/breakable`, then the following algorithm is executed:

1. The box content is read to a box register similar but not identical to the unbreakable case.
2. If the total box fits into the current page, it is shipped out visibly unbroken and the algorithm stops.
3. Otherwise, it is checked if at least `/tcb/lines before break` of the upper box can be placed on the current page. If not, a page break is inserted and the algorithm goes back to Step 2.
4. Now, the `break sequence` starts. The upper box part or the lower box part is split such that it fits into the current page. The fitting part is named `first part` of the `break sequence` and shipped out.
5. If the remaining content of the total box fits into the current page, the algorithm continues with Step 7, else with Step 6.
6. The upper box part or the lower box part is split such that it fits into the current page. The fitting part is named `middle part` of the `break sequence` and shipped out. Then, the algorithm goes back to Step 5.
7. The remaining part is named `last part` of the `break sequence` and shipped out. The algorithm stops.

The algorithm takes care that the optional segmentation line never appears at the end of a box. The optional lower box part is also checked to have at least `/tcb/lines before break`. 

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In principal, all boxes of the *break sequence* share the same geometric parameters. The differences are:

- The given `/tcb/before`*P.72* and `/tcb/after`*P.72* values are used only before the *first* and after the *last* part of the *break sequence*.

- A special behavior between the parts of the *break sequence* can be given by `/tcb/toprule at break`*P.301*, `/tcb/bottomrule at break`*P.301*, `/tcb/enlarge top at break`*P.77*, and `/tcb/enlarge bottom at break`*P.77*.

- The `/tcb/skin`*P.105* decides how the *first*, *middle*, and *last* part look like. Actually, every part type has its own skin given by the options `/tcb/skin first`*P.105*, `/tcb/skin middle`*P.105*, and `/tcb/skin last`*P.105*. Typically, these options are set automatically by the main skin, see Subsection 15.6 from page 306.

### 15.2 Limitations and Known Bugs

- The maximal total height of the upper and of the lower part of normal breakable `tcolorbox`es is about 65536pt (ca. 2300cm) apiece. If such a part gets longer, the output will get buggy without warning. For very oversized boxes which are longer than 65536pt, use the `unlimited` value for `/tcb/breakable`*P.297*. With the `unlimited` setting, the applied algorithm has (virtually) no height limit for boxes, but very likely the compiler memory will have to be increased for boxes longer than 300 pages (depending on compiler settings and box content). But it is recommended to use `unlimited` for critical large boxes only.

- You can nest an unbreakable `tcolorbox` inside another `tcolorbox`, even inside a breakable one. But you cannot not nest a breakable box inside a breakable box. The `/tcb/breakable`*P.297* key for a nested box is ignored automatically4, i.e. inner boxes are always unbreakable.

After all, in the unlikely case you really want to have the nested box to be breakable, use `/tcb/enforce breakable`*P.298* for the nested box5. **But, a breakable box inside a breakable box will usually give a mess.**

- If your text content contains some text color changing commands, your color will not survive the break to the next box. But, with the `fontspec` package and `xelatex` or `lualatex`, you can use \addfontfeatures{Color=mycolor} to add a font color which survives the break.

- The `perpage` option of the `footmisc` package is deliberately deactivated inside a breakable box since all footnotes are placed at the end of the box (possibly far away from the reference point).

---

4 Until `tcolorbox` 3.04, the `/tcb/breakable`*P.297* key was not ignored for nested boxes.

5 `/tcb/enforce breakable`*P.298* acts like `/tcb/breakable`*P.297* until `tcolorbox` 3.04.
15.3 Main Option Keys

/\texttt{tcb/breakable}=true|false|unlimited  \hspace{1cm} (default \texttt{true}, initially \texttt{false})

Allows the \texttt{tcolorbox} to be breakable. If the box is larger than the available space at the current page, the box is automatically broken and continued to the next next page. All sorts of \texttt{tcolorbox} can be made breakable. It depends on the skin how the breaking looks like. If you do not know better, use /\texttt{tcb/enhanced}\textsuperscript{P.169} for breaking a box. The parts of the break sequence are numbered by the counter \texttt{tcbbreakpart}.

- \texttt{false}: Sets the \texttt{tcolorbox} to be unbreakable.
- \texttt{true}: Breaks the \texttt{tcolorbox} from one page to another. The maximal total height of the upper and of the lower part is about 65536pt (ca. 2300cm or ca. 90 pages) apiece.
- \texttt{unlimited}: Experimental code for unlimited total height of breakable boxes. For boxes longer than 300 pages (or even shorter ones) the compiler memory will have to be increased.

\% \usepackage{lipsum} % preamble
\tcbsset{enhanced jigsaw,colback=red!5!white,colframe=red!75!black,\
watermark color=yellow!25!white,watermark text=\arabic{tcbbreakpart},\nfonttitle=bfseries}

\begin{tcolorbox}
[breakable,title=My breakable box]
\lipsum[1-6]
\end{tcolorbox}

My breakable box


/tcb/unbreakable (no value, initially set)
Sets the tcolorbox to be unbreakable.

/tcb/enforce breakable (no value)
A tcolorbox inside a tcolorbox is automatically set to be unbreakable. Using /tcb/breakable on such an inner box has no effect. If one really wants the inner box to be breakable, use /tcb/enforce breakable. **This will usually give a mess of shattered boxes. You are advised to not use this option.**

Note that /tcb/enforce breakable has the functionality that /tcb/breakable had until package version 3.04 and exists for backward compatibility.

/tcb/title after break=⟨text⟩ (no default, initially empty)
The /tcb/title is used only for the first part of a break sequence. Use title after break to create a heading line with ⟨text⟩ as content for all following parts.

/tcb/notitle after break (no value, initially set)
Removes the title line or following parts in a break sequence if set before.

/tcb/adjusted title after break=⟨text⟩ (style, no default, initially unset)
Works like /tcb/adjusted title but applied to /tcb/title after break.

/tcb/lines before break=⟨number⟩ (no default, initially 2)
Assures that the given ⟨number⟩ of lines of the upper box part or the lower box part are placed before a break happens.
### tcb/break at=⟨length⟩/⟨length⟩/.../⟨length⟩

(no default, initially 0pt)

Defines break points at the given ⟨length⟩ values. The first ⟨length⟩ defines the (maximal) height of the first partial box, the second ⟨length⟩ defines the (maximal) height of the second partial box, and so on. The last ⟨length⟩ value is applied to all following partial boxes if any. Setting a length to 0pt means that the naturally available space is used for breaking.

```latex
% \usepackage{multicol,lipsum}
\begin{multicol}{3}\footnotesize
Breakable boxes inside a |multicols| environment need special attendance. They are broken by default at |\textheight|. The |break at| option can be used to insert better break points by hand.
\begin{tcolorbox}[enhanced jigsaw,size=small,vfill before first,
colframe=red,colback=yellow!10!white,before title=\raggedright,
title={Broken box inside a |multicols| environment},fonttitle=\bfseries,
enforce breakable,\% use only breakable in the real world!
pad at break=1mm,break at=3cm/6.3cm ]
\lipsum[1]
\end{tcolorbox}
\refKey{/tcb/height fixed for} may also be considered for |multicols| environments.
\end{multicol}
```

### tcb/enlargepage=⟨length⟩/⟨length⟩/.../⟨length⟩

(no default, initially 0pt)

Inserts a \enlargethispage{⟨length⟩} to the pages of the break sequence, i.e. allows one to enlarge (or shrink) partial boxes. The first ⟨length⟩ is applied to the first partial box, the second ⟨length⟩ is applied to the second partial box, and so on. The last ⟨length⟩ value is applied to all following partial boxes if any. Note that floating boxes will not be enlarged.

```latex
\begin{tcolorbox}[breakable,\enlargepage=0mm/\baselineskip/2/\baselineskip/0mm,...

The example code enlarged the second partial box by one line, the third partial box by two lines, and all following parts are not enlarged.

If an automated page break occurs before the first partial box, the page enlargement is applied to the page before the first partial box and again to the page of the first partial box. Insert a manual break to prevent this.

In general, \enlargepage should be used at the final stage of a document for fine-tuning only.
% The following setting hinders orphan lines for the last partial box
\tcbset{enlargepage flexible=baselineskip}

\tcb/enlargepage flexible=⟨length⟩ (no default, initially 0pt)
This allows an automated page enlargement for up to ⟨length⟩. The algorithm can use this

to avoid breaking a box, if there is enough room after enlargement. Also, the last partial

box of a break sequence may be enlarged to avoid further breaking.
Note that this potential enlargement is additive to settings of \tcb/enlargepage → P. 299.
But \tcb/enlargepage flexible overwrites settings of \tcb/pad before break* → P. 301
or \tcb/pad at break* → P. 301.

\tcb/compress page=⟨option⟩ (default all, initially baselineskip)
This option controls the space management on the page which contains the unbroken box
or the first part of a break sequence. Feasible ⟨option⟩ values are:
• all (default value): All shrinkable glue on the page is potentially used for the unbroken

box or the first part of a break sequence. Thus, all vertical spaces on the page will

potentially be reduced to their minimal values.
• baselineskip (initial value): Shrinkable glue up to one \baselineskip on the page

is potentially used for the unbroken box or the first part of a break sequence.
• none: The break algorithm respects the target size of the given glue values on the

page. This was the initial value before version 3.34.

Note that the box content is not influenced by this option.

\tcb/shrink break goal=⟨length⟩ (no default, initially 0pt)
This is an emergency parameter if the break algorithm produces unpleasant breaks. It
shrinks the goal height of the current box part by ⟨length⟩ which may result in smaller
boxes. Never use negative values. Usually, this option will never be needed at all.
15.4 Option Keys for the Break Appearance

/tcb/toprule at break\[=\langle length\rangle\] (no default, initially 0.5mm)
Sets the line width of the top rule to \langle length\rangle if the box is /tcb/breakable \[P.297\].
In this case, it is applied to middle and last parts in a break sequence. Note that /tcb/toprule \[P.29\] overwrites this value if used afterwards.

/tcb/bottomrule at break\[=\langle length\rangle\] (no default, initially 0.5mm)
Sets the line width of the bottom rule to \langle length\rangle if the box is /tcb/breakable \[P.297\].
In this case, it is applied to first and middle parts in a break sequence. Note that /tcb/bottomrule \[P.29\] overwrites this value if used afterwards.

/tcb/topsep at break\[=\langle length\rangle\] (no default, initially 0mm)
Additional vertical space of \langle length\rangle which is added at the top of middle and last parts in a break sequence. In general, it is not advisable to change this value if these parts start with a rule or a title.

/tcb/bottomsep at break\[=\langle length\rangle\] (no default, initially 0mm)
Additional vertical space of \langle length\rangle which is added at the bottom of first and middle parts in a break sequence. In general, it is not advisable to change this value if these parts end with a rule.

/tcb/pad before break\[=\langle length\rangle\] (style, no default, initially 3.5mm)
Sets the total amount of vertical space after the text content and before the break point to \langle length\rangle. This style sets /tcb/toprule at break to 0pt and changes /tcb/topsep at break as required. In general, it is not advisable to change this value if the middle and last parts in a break sequence start with a rule or a title.

/tcb/pad before break*\[=\langle length\rangle\] (style, no default)
Sets /tcb/pad before break to \langle length\rangle and /tcb/enlargepage flexible \[P.300\] to an appropriate value such that empty closing frames are avoided.

/tcb/pad after break\[=\langle length\rangle\] (style, no default, initially 3.5mm)
Sets the total amount of vertical space after the break point and before the text content to \langle length\rangle. This style sets /tcb/bottomrule at break to 0pt and changes /tcb/bottomsep at break as required. In general, it is not advisable to change this value if the first and middle parts in a break sequence end with a rule.

/tcb/pad at break\[=\langle length\rangle\] (style, no default, initially 3.5mm)
Abbreviation for setting \langle length\rangle to /tcb/pad before break and /tcb/pad after break.
/tcb/pad at break*\[=\langle length\rangle\] (style, no default)
Sets /tcb/pad at break to \langle length\rangle and /tcb/enlargepage flexible \[P.300\] to an appropriate value such that empty closing frames are avoided.

% \usepackage{lipsum} % preamble
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}
\begin{tcolorbox}[enhanced jigsaw,breakable,pad at break*=0mm, title={For this box, the pad space at the break point is set to 0mm}]
\lipsum[1-2]
\end{tcolorbox}

For this box, the pad space at the break point is set to 0mm


\texttt{/tcb/pad at break}^{*\textsuperscript{P.301}} or \texttt{/tcb/pad at break}\textsuperscript{*\textsuperscript{P.301}} should be used as very last option in an option list, because they adapt other settings.

Also see \texttt{/tcb/enlarge top at break by}^{*\textsuperscript{P.77}} and \texttt{/tcb/enlarge bottom at break by}^{*\textsuperscript{P.77}}.

\texttt{/tcb/height fixed for=(part)} \hspace{1cm} (no default, initially \texttt{none})

When certain amount of space is available for a partial box of a break sequence, the partial box typically is smaller than this space (depending on the box content). For given \texttt{(part)}(s), the height can be set to all available space.

- \texttt{none}: Every partial \texttt{tcolorbox} is set with its natural height.
- \texttt{first}: The \texttt{first} partial box is set to a height which matches the available space.
- \texttt{middle}: All \texttt{middle} partial boxes are set to a height which matches the available space.
- \texttt{last}: The \texttt{last} partial box is set to a height which matches the available space.
- \texttt{first and middle}: The \texttt{first} and all \texttt{middle} partial boxes are set to a height which matches the available space.
- \texttt{middle and last}: All \texttt{middle} partial boxes and the \texttt{last} partial box are set to a height which matches the available space.
- \texttt{all}: All partial boxes are set to a height which matches the available space.

If the box keeps unbroken, this option is not applied. See \texttt{/tcb/height}^{*\textsuperscript{P.45}} for setting a fixed height for unbroken boxes. See \texttt{/tcb/height fill}^{*\textsuperscript{P.47}} for giving unbroken boxes maximum height.

\texttt{/tcb/vfill before first=true|false} \hspace{1cm} (default \texttt{true}, initially \texttt{false})

Inserts a \texttt{\vfill} at the begin of the \texttt{first} partial box to move this partial box to the end of the current page. This may be used as an alternative to \texttt{/tcb/height fixed for=first} to get justified columns or pages. The \texttt{\vfill} is not inserted, if the box gets not actually broken.
### 15.5 Breakable boxes and the multicol package

Unbreakable \texttt{tcolorboxes} can be used without special care inside a \texttt{multicols} environment from the \texttt{multicol} package \cite{9}. Since version 3.10, a breakable \texttt{tcolorbox} detects, if it is used inside a \texttt{multicols} environment. But choosing break points for a breakable box cannot be done by the balancing routine of \texttt{multicols}. By default, boxes will break at $\texttt{\texttt{texttheight}}$. To get pleasant results, use the \texttt{/tcb/break at} \S\texttt{.299} and \texttt{/tcb/height fixed for} \S\texttt{.302} options.

\begin{verbatim}
% \usepackage{lipsum,multicol} % preamble
\small
\begin{multicols}{2}
\lipsum[1]
\begin{tcolorbox}[
\texttt{enhanced jigsaw,breakable,size=title,
\texttt{colback=red!5!white,colframe=red!75!black,fonttitle=bfseries,
\texttt{title=My breakable box.pad at break=1mm, break at=7.5cm/Opt}]
\lipsum[2-4]
\end{tcolorbox}
\lipsum[4]
\end{multicols}
\end{verbatim}


**My breakable box**


Nulla malesuada porttitor diam. Donec felis erat, congue non, voluput at, tincidunt tistique, libero. Vivamus viverra fermentum felis.


This example is already set inside a `multicol` environment. This time, a `middle` part has full \textheight. `/tcb/height fixed for` for P.302 is used to spread this box part over the full height to align with neighboring columns.

\begin{tcolorbox}[enhanced]
\begin{tabular}{jigsaw, breakable, size=title, colback=red!5!white, colframe=red!75!black, fonttitle=\bfseries, title=My breakable box, pad at break=2mm, break at=8.2cm/0pt, height fixed for=middle ]
\lipsum[2-7]
\end{tabular}
\end{tcolorbox}


My breakable box

quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.


The following example has a \colorbox which fills the \multicols environment completely. Here, /tcb/height fixed for *P.302 is used to give all three columns the full height. Note that the appropriate /tcb/break at *P.299 value is not computed automatically but set manually.

```
% \usepackage{lipsum,multicol} % preamble
\small
\begin{multicols}{3}
\begin{tcolorbox}
\[enhanced jigsaw,breakable,size=small, colback=red!5!white,colframe=red!75!black,fonttitle=bfseries, title=My breakable box,pad at break=2mm,drop fuzzy shadow, height fixed for=all, break at=11.4cm ]
\lipsum[1-3]
\end{tcolorbox}
\end{multicols}
```

My breakable box


15.6 Break Sequence for the Skins

The following diagrams document the break sequence for different skins. Depending on the main skin of a \texttt{tcolorbox}, the actual skins of the break sequence parts are displayed.
<table>
<thead>
<tr>
<th>Unbroken Box</th>
<th>Broken Boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>skin=enhanced</td>
<td>skin=enhancedfirst</td>
</tr>
<tr>
<td></td>
<td>skin=enhancedmiddle</td>
</tr>
<tr>
<td></td>
<td>skin=enhancedmiddle</td>
</tr>
<tr>
<td></td>
<td>skin=enhancedmiddle</td>
</tr>
<tr>
<td></td>
<td>skin=enhancedmiddle</td>
</tr>
<tr>
<td></td>
<td>skin=enhancedmiddle</td>
</tr>
<tr>
<td></td>
<td>skin=enhancedmiddle</td>
</tr>
</tbody>
</table>

307
Unbroken Box

- skin=enhanced jigsaw

Broken Boxes

- skin=enhancedfirst jigsaw
- skin=enhancedmiddle jigsaw
- skin=enhancedlast jigsaw

Unbroken Box

- skin=enhancedfirst jigsaw

Broken Boxes

- skin=enhancedfirst jigsaw
- skin=enhancedmiddle jigsaw
- skin=enhancedmiddle jigsaw

Unbroken Box

- skin=enhancedmiddle jigsaw

Broken Boxes

- skin=enhancedmiddle jigsaw
- skin=enhancedmiddle jigsaw
- skin=enhancedmiddle jigsaw

Unbroken Box

- skin=enhancedlast jigsaw

Broken Boxes

- skin=enhancedmiddle jigsaw
- skin=enhancedmiddle jigsaw
- skin=enhancedlast jigsaw
<table>
<thead>
<tr>
<th>Unbroken Box</th>
<th>Broken Boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>skin=bicolor</td>
<td>skin=bicolorfirst</td>
</tr>
<tr>
<td></td>
<td>skin=bicolormiddle</td>
</tr>
<tr>
<td></td>
<td>skin=bicolorlast</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Unbroken Box</td>
<td>Broken Boxes</td>
</tr>
<tr>
<td>skin=bicolorfirst</td>
<td>skin=bicolorfirst</td>
</tr>
<tr>
<td></td>
<td>skin=bicolormiddle</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Unbroken Box</td>
<td>Broken Boxes</td>
</tr>
<tr>
<td>skin=bicolormiddle</td>
<td>skin=bicolormiddle</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Unbroken Box</td>
<td>Broken Boxes</td>
</tr>
<tr>
<td>skin=bicolorlast</td>
<td>skin=bicolormiddle</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Unbroken Box

skin=beamer

Broken Boxes

skin=beamerfirst

skin=beamermiddle

skin=beamermiddle

skin=beamerlast

Unbroken Box

skin=beamerfirst

Broken Boxes

skin=beamerfirst

skin=beamermiddle

skin=beamermiddle

skin=beamermiddle

Unbroken Box

skin=beamermiddle

Broken Boxes

skin=beamermiddle

skin=beamermiddle

skin=beamermiddle

skin=beamermiddle

Unbroken Box

skin=beamerlast

Broken Boxes

skin=beamermiddle

skin=beamermiddle

skin=beamerlast
15.7 Break by Hand (Faked Break)

See Section 15.5 on page 303 for real column breaks.

Since the appearance of broken boxes is done by skins, it is quite easy to 'fake a break'. For this, you actually don’t need the \texttt{breakable} library at all.

\begin{tcolorbox}
\textbf{My broken box}
\begin{itemize}
\item This is a box which breaks from one column to another
\item I am sorry to say that this is a trick. Nevertheless, you may use this trick for your own purposes.
\end{itemize}
\end{tcolorbox}

\begin{verbatim}
\tcboxset{enhanced,equal height group=fakedbreak, colback=LightGreen,colframe=DarkGreen, width=(\linewidth-6mm)/3,nobeforeafter, left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
\begin{tcolorbox}[title=My broken box,skin=enhancedfirst]
This is a box which breaks from one column to another
\end{tcolorbox}\hfill
\begin{tcolorbox}[skin=enhancedmiddle]
column. I am sorry to say that this is a trick. Nevertheless, you may use this trick for your own purposes.
\end{tcolorbox}\hfill
\begin{tcolorbox}[skin=enhancedlast]
\end{tcolorbox}
\end{verbatim}
16 Library fitting

The library is loaded by a package option or inside the preamble by:

\tcbuselibrary{fitting}

16.1 Macros of the Library

\tcboxfit\{\textit{options}\}\{\textit{box content}\}

Creates a colored box where the given \textit{box content} is fitted to the width and height of the box. A \texttt{tcbfit} has to have a fixed height. If no fixed height is given, a square box is constructed. In principal, most \textit{options} for a \texttt{tcolorbox}\footnote{P.11} can be used for \texttt{tcbfit} with some restrictions. A \texttt{tcbfit} cannot have a lower part and cannot be broken.

\begin{tcbaster}\texttt{tcbset\{colframe=blue!50!black, colback=red!10!white, boxsep=0pt, top=1mm, bottom=1mm, left=1mm, right=1mm, fit algorithm=hybrid*, raster equal skip=1mm\}}\end{tcbaster}

\begin{tcbaster}\texttt{\begin{tcbraster}\texttt{\[colback=green!10!white, boxsep=1mm\]}\end{tcbraster}\begin{tcbraster}\texttt{[raster columns=3, raster valign=bottom]}\end{tcbraster}\tcbset\% \texttt{\usepackage\{lipsum\} \tcbuselibrary\{raster\}}}\end{tcbaster}

With a title

\begin{tcbaster}\texttt{\begin{tcbraster}\texttt{[height=4cm, title=With a title\{}\texttt{\{\textit{lipsum\[2\]}\}}}\end{tcbraster}}\end{tcbaster}


See Section 18.6 on page 347 for more elaborate methods to create new commands.

\newtcbxofit[(init options)]{⟨name⟩}[⟨number⟩][⟨default⟩]{⟨options⟩}

 Creates a new macro ⟨name⟩ based on \tcboxfit\textsuperscript{\textsuperscript{-}P.315}. Basically, \newtcbxofit operates like \newcommand. The new macro ⟨name⟩ optionally takes ⟨number⟩+1 arguments, where ⟨default⟩ is the default value for the optional first argument. The ⟨options⟩ are given to the underlying \tcboxfit. The ⟨init options⟩ allow setting up automatic numbering, see Section 5 from page 92.

\newtcbxofit{mybox}{colback=red!5!white, colframe=red!75!black, width=4cm, height=1.5cm,center upper}
\mybox{This is my own box.}\par
\mybox{This is my own box with more text to be written.}

% \usepackage{lipsum}
\newtcbxofit{mybox}[2]{colback=red!5!white, colframe=red!75!black, fonttitle=\bfseries, boxsep=1mm,left=0mm,right=0mm,top=0mm, bottom=0mm,center upper, valign=center, nobeforeafter, width=#1, height=#2}
\mybox[2.5cm]{1cm}{First box}\
\mybox[2.5cm]{1cm}{Second box with more text}\
\mybox[5cm]{2cm}{Third box with text}\
\mybox[5cm]{3cm}{lipsum[1]}

% \usepackage{lipsum}
\newtcbxofit{mybox}[2]{colback=red!5!white, colframe=red!75!black, width=#2,height=#2/3*2,#1}
\mybox[5cm]{colback=yellow}{lipsum[2]}

\renewtcbxofit[(init options)]{⟨name⟩}[⟨number⟩][⟨default⟩]{⟨options⟩}

 Operates like \newtcbxofit, but based on \renewcommand instead of \newcommand. An existing macro is redefined.

\tcbfontsize{⟨factor⟩}

 Selects a font size inside a tcolorbox which is scaled with the given ⟨factor⟩ relative to \tcbfitdim.

\tcbset{colback=red!5!white, colframe=red!75!black}
\begin{tcolorbox}[fit basedim=10pt]
\{\tcbfontsize{0.25} Very tiny,\\
\{\tcbfontsize{0.5} Small,\\
\{\tcbfontsize{1} Normal,\\
\{\tcbfontsize{2} Large,\\
\{\tcbfontsize{4} Huge.\\
\end{tcolorbox}
The font size for the content of a box with fixed width and fixed height can be adjusted automatically. This is called the *fitbox capture mode*. Note that the fit control algorithm constructs a series of versions for the box and selects the ‘best’. Therefore, the compilation time is quite longer than for a normal box. The algorithm will fail, if a different selected font size does not change the overall size of the box content. The \texttt{tcbfit} \cite{315} macro uses this algorithm by default.

The fit control keys are only applicable to unbreakable boxes without a lower part. The box content should not change counters.

\texttt{/tcb/fit} \hspace{1cm} (style, initially unset)

Sets the \texttt{/tcb/capture} \cite{85} mode to \texttt{fitbox}, i.e. enables the font size adjustment algorithm. Thereby, a \texttt{tcolorbox} \cite{11} acts like \texttt{tcbfit} \cite{315} where the given \texttt{⟨box content⟩} is fitted to the width and height of the box. Therefore, the box has to have a fixed height. If no fixed height is given, a square box is constructed. The font dimension \texttt{tcbfitdim} can also be used to adjust the margins of the box since a box with a tiny font may not need large margins. The number of constructed boxes is saved to the macro \texttt{tcbfitsteps} for analysis.

\begin{verbatim}
\% \usepackage{lipsum}
\% \tcbuselibrary{skins}
\newtcolorbox{fitting}[2]{fit,height=#2,boxsep=1pt,valign=center,opacityupper=0.5,
top=0.4\tcbfitdim,bottom=0.4\tcbfitdim,left=0.75\tcbfitdim,right=0.75\tcbfitdim,enhanced,watermark text=\{\texttt{tcbfitsteps}\},colframe=blue!75!black,colback=white,#1}
\begin{fitting}{4cm}
\lipsum[1]
\end{fitting}
\begin{fitting}{2cm}
\lipsum[2]
\end{fitting}
\begin{fitting}{1cm}
\lipsum[3]
\end{fitting}
\end{verbatim}

\texttt{\textbackslash \begin{fitting}⟨box size⟩\textbackslash \lipsum[⟨block number⟩]\textbackslash \end{fitting}}

\texttt{\textbackslash \lipsum[⟨block number⟩]}
/tcb/fit to=⟨width⟩ and ⟨height⟩ (style, initially unset)
Shortcut for using /tcb/fit \textsuperscript{P.317} and setting the ⟨width⟩ and ⟨height⟩ values separately.

\texttt{\textbackslash tcbset\{colback=red!5!white, colframe=red!75!black\}}
\begin{tcolorbox}[fit to=3cm and 2cm]
This box content is fitted to the given dimensions.
\end{tcolorbox}
This box content is fitted to the given dimensions.

/tcb/fit to height=⟨height⟩ (style, initially unset)
Shortcut for using /tcb/fit \textsuperscript{P.317} and setting the ⟨height⟩ value separately.

\texttt{\textbackslash tcbset\{colback=red!5!white, colframe=red!75!black\}}
\begin{tcolorbox}[fit to height=2cm]
This box content is fitted to the given height.
\end{tcolorbox}
This box content is fitted to the given height.

/tcb/fit basedim=⟨length⟩ (no default, initially 10pt)
Sets the starting font dimension for the font size adjustment algorithm to ⟨length⟩. The algorithm never enlarges this dimension.

\texttt{\textbackslash tcbset\{colback=red!5!white, colframe=red!75!black\}}
\begin{tcolorbox}[fit to=4cm and 2cm, fit basedim=50pt]
Too few words for the box.
\end{tcolorbox}
Too few words for the box.

\begin{tcolorbox}[fit to=4cm and 2cm]

Enough words for the box.
\end{tcolorbox}

/tcb/fit skip=⟨real value⟩ (no default, initially 1.2)
Sets the skip value of the selected font to ⟨real value⟩ times \texttt{tcbfitdim}.

% \usepackage{lipsum}
\texttt{\textbackslash tcbset\{colback=red!5!white, colframe=red!75!black, left=1mm, right=1mm, boxsep=0mm\}}
\begin{tcolorbox}[fit to=5cm and 4cm, fit skip=1.0 \]
\texttt{\textbackslash lipsum[1]}\end{tcolorbox}
Redefines the standard \LaTeX font size macros \tiny, \scriptsize, \footnotesize, \small, \normalsize, \large, \Large, \LARGE, \huge, and \Huge, to set font sizes relative to the current \tcbfitdim. Note that the display skip values for mathematical formulas are respected by the redefined macros.

% \usepackage{lipsum}
\tcbset{colback=red!5!white, colframe=red!75!black,left=1mm, right=1mm,boxsep=0mm}

\begin{tcolorbox}[fit to height=4cm]
  {\Large\bfseries This text is not adapted:\par}
  \lipsum[2]
\end{tcolorbox}

\begin{tcolorbox}[fit to height=4cm, fit fontsize macros]
  {\Large\bfseries This text is adapted:\par}
  \lipsum[2]
\end{tcolorbox}

% \let\realHuge=\Huge
\let\realHuge=\Huge
\begin{tcolorbox}[fit basedim=7pt, fontupper=\normalsize, fit fontsize macros]
  The relative relative font size macros are also usable without the \textit{fit} algorithm.\par
  {\Huge Adapted Huge} --- {\realHuge Original Huge}
\end{tcolorbox}

\tcbset{size=fbox,colback=red!5!white, colframe=red!75!black}
\tcboxfit[height=5cm, fit fontsize macros, fonttitle=\normalsize\bfseries, title=Adapted title]
{\lipsum[2]}
The box is allowed to enlarge the fixed height up to the given \texttt{(dimension)}, before a font size fit is applied. An optional \texttt{/tcb/fit width plus} is tried after the height adaption.

\begin{tcolorbox}[fit]
This is a tcolorbox.
\end{tcolorbox}
\begin{tcolorbox}[fit,fit height plus=1cm]
This is a tcolorbox.
\end{tcolorbox}
\begin{tcolorbox}[fit]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit,fit height plus=1cm]
\lipsum[2]
\end{tcolorbox}

This is a tcolorbox.
This is a tcolorbox.

\begin{tcolorbox}[fit,fit width plus=1cm]
This is a tcolorbox.
\end{tcolorbox}
\begin{tcolorbox}[fit]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit,fit width plus=1cm]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit,fit width plus=1cm]
This is a tcolorbox.
\end{tcolorbox}
\begin{tcolorbox}[fit,fit width plus=1cm]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit,fit width plus=1cm]
\lipsum[2]
\end{tcolorbox}

\begin{tcolorbox}[fit,fit width plus=1cm]
This is a tcolorbox.
\end{tcolorbox}
\begin{tcolorbox}[fit,fit width plus=1cm]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit,fit width plus=1cm]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit,fit width plus=1cm]
\lipsum[2]
\end{tcolorbox}

This is a tcolorbox.
This is a tcolorbox.

\begin{tcolorbox}[fit,fit width plus=1cm]
This is a tcolorbox.
\end{tcolorbox}
\begin{tcolorbox}[fit]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit]
\lipsum[2]
\end{tcolorbox}
\begin{tcolorbox}[fit]
\lipsum[2]
\end{tcolorbox}

This is a tcolorbox.
Typically but not necessarily, the optional title of a \texttt{tcolorbox} is not part of the fit operation. If a \texttt{/tcb/fit width plus} is applied, the title is also adapted to the new width. If counters are increased inside the title text, they may be increased more than one time. To avoid this, you are encouraged to use \texttt{/tcb/phantom} \cite{P.88} or \texttt{/tcb/step and label} \cite{P.88} to set counters or use automatic numbering, see Subsection 5.1 from page 92.

\texttt{/tcb/fit width from}\texttt{=}\langle\textit{min}\rangle\text{ to }\langle\textit{max}\rangle\texttt{ \quad (style, no default)}

Sets the box width to \langle\textit{min}\rangle and allows the width to grow up to \langle\textit{max}\rangle.

\begin{Verbatim}
\% \usepackage{lipsum}
\tcbset{colback=red!5!white,colframe=red!75!black,left=1mm,top=1mm,bottom=1mm, right=1mm,boxsep=0mm,height=4cm}

\begin{tcolorbox}[fit,width=\linewidth/2]
\lipsum[2]
\end{tcolorbox}\par
\begin{tcolorbox}[fit width from=\linewidth/2 to \linewidth]
\lipsum[2]
\end{tcolorbox}\par
\end{Verbatim}
\begin{mybox}
This is a tcolorbox.
\end{mybox}
\begin{mybox}
This is a tcolorbox. This is a tcolorbox. This is a tcolorbox.
\end{mybox}
\lipsum[2]
/tcb/fit algorithm=(name) (no default, initially fontsize)
Sets the algorithm for the fitting process after optionally width and height are adapted.
Feasible values for ⟨name⟩ are:

- **fontsize** (initial): The algorithm is a bisection method that adapts the font size until certain stop conditions are fulfilled. This is the most time-consuming method but it is robust and gives pleasant results.
  
  The used font has to be freely scalable for this method! Other content than text is not scaled down. The aspect ratio is fully garanteed.

- **fontsize**: First, the fontsize algorithm is applied. If the font was scaled down and the resulting height is too small, the box is squeezed to fit the area.
  
  The used font has to be freely scalable for this method! Other content than text may be slightly rescaled. The aspect ratio cannot be fully garanteed.

- **areasonize**: The algorithm calculates the area size for the text without scaling the font.
  The text box is shaped for the needed aspect ratio in one or two steps. Finally, it is scaled down with a standard \resizebox macro.
  
  The used font has not to be scalable. Every box content is scaled down. The aspect ratio cannot be fully garanteed.

- **areasonize**: The areasonize algorithm is applied, but if the content was scaled down and the resulting height is too small, the box is squeezed to fit the area.
  
  The used font has not to be scalable. Every box content is scaled down. The aspect ratio cannot be fully garanteed.

- **hybrid**: First, this algorithm estimates the needed font size in one or two steps. Then an areasonize fitting as above is a applied.
  
  The used font has to be freely scalable for this method! Other content than text may be slightly rescaled. The aspect ratio cannot be fully garanteed.

- **hybrid**: First, this algorithm estimates the needed font size in one or two steps. Then an areasonize fitting as above is a applied.
  
  The used font has to be freely scalable for this method! Other content than text may be slightly rescaled. The aspect ratio cannot be fully garanteed.

- **squeeze**: The text box is brutally scaled down to fit.
  
  The aspect ratio is very likely to be horrible. You should not use this method for final documents.
Quality . . . . . . . . . . . . . . . . . . . . . . . . . . . . . versus . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Speed

Quality . . . . . . . . . . . . . . . . . . . . . . . . . . . . . versus . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Speed
The following options set control parameters for the fit algorithm. Mainly, they apply to the `fontsize` variant, see `/tcb/fit algorithm` \[^{p.323}\]. The options should be seen as experimental and are likely to change in future versions, if necessary.

\begin{itemize}
  \item `/tcb/fit maxstep=(number)` (no default, initially 20)
    Sets the maximal step size for the font size adjustment algorithm. In normal situations, the algorithm stops before reaching the initial value of 20 steps. If the box content does not shrink, this value prevents an endless loop.
  \item `/tcb/fit maxfontdiff=(dimension)` (no default, initially 0.1pt)
    The algorithm stops, if the font size is determined within a deviation of `(dimension)`.
  \item `/tcb/fit maxfontdiffgap=(dimension)` (no default, initially 1pt)
    The algorithm stops, if the number of lines is determined and the font size is determined within a deviation of `(dimension)`.
  \item `/tcb/fit maxwidthdiff=(dimension)` (no default, initially 1pt)
    The algorithm stops, if the (optionally) flexible box width is determined within a deviation of `(dimension)`.
  \item `/tcb/fit maxwidthdiffgap=(dimension)` (no default, initially 10pt)
    The algorithm stops, if the number of lines is determined and the (optionally) flexible box width is determined within a deviation of `(dimension)`.
  \item `/tcb/fit warning=(value)` (no default, initially off)
    Typically, the fit control algorithm constructs several auxiliary boxes to determine the optimal one. If not switched off, the construction of the auxiliary boxes may produce many \hbadness{} warnings. This option key changes the \hbadness{} value.
    \begin{itemize}
      \item **off**: Most of ‘Underfull \hbox’ and ‘Overfull \hbox’ warnings are switched off (including the ones for the finally used box).
      \item **on**: All warnings for all auxiliary boxes are displayed.
      \item **final**: Only warnings for the finally used box are displayed. Note that an additional box has to be constructed for these messages.
    \end{itemize}
\end{itemize}
17 Library \textbf{hooks}

The library is loaded by a package option or inside the preamble by:

\begin{verbatim}
\tcbuselibrary{hooks}
\end{verbatim}

For the skin related options, the library \textbf{skins} has to be loaded separately.

17.1 Concept of Hooks

A hook is a placeholder in some \LaTeX code where additional code can be added. For example, the \LaTeX macro \texttt{\textbackslash AtBeginDocument} adds code to a hook which is placed at the beginning of every document.

Several option keys of \texttt{tcolorbox} allow providing some code which is added to specific places of a colored box. For example, \texttt{/tcb/before upper} \textsuperscript{P.52} places code before the content of the upper part. A following usage of this key overwrites any prior settings.

The library \textbf{hooks} extends \texttt{/tcb/before upper} \textsuperscript{P.52} and several more existing keys to 'hookable' versions, e.g. \texttt{/tcb/before upper app} \textsuperscript{P.327} and \texttt{/tcb/before upper pre} \textsuperscript{P.327}. The 'hookable' keys don’t overwrite prior settings but either append or prepend the newly given code to the existing code.

The general naming convention (with some small exceptions) is:

- \texttt{(option key) app}: works like \texttt{(option key)} but append its code to the existing code.
- \texttt{(option key) pre}: works like \texttt{(option key)} but prepend its code to the existing code.

If the original \texttt{(option key)} is used (again), all code will be overwritten. Therefore, the order of the option key usage is crucial.
17.2 Box Content Additions

The following option keys extend the options given in Subsection 4.10 from page 52.

/tcb/before title app\(=\langle\text{code}\rangle\) (no default)
- Appends the given \(\langle\text{code}\rangle\) to \(/tcb/before\ title^{P.52}\) after the color and font settings and before the content of the title.

/tcb/before title pre\(=\langle\text{code}\rangle\) (no default)
- Prepends the given \(\langle\text{code}\rangle\) to \(/tcb/before\ title^{P.52}\) after the color and font settings and before the content of the title.

/tcb/after title app\(=\langle\text{code}\rangle\) (no default)
- Appends the given \(\langle\text{code}\rangle\) to \(/tcb/after\ title^{P.52}\) after the content of the title.

/tcb/after title pre\(=\langle\text{code}\rangle\) (no default)
- Prepends the given \(\langle\text{code}\rangle\) to \(/tcb/after\ title^{P.52}\) after the content of the title.

/tcb/before upper app\(=\langle\text{code}\rangle\) (no default)
- Appends the given \(\langle\text{code}\rangle\) to \(/tcb/before\ upper^{P.52}\) after the color and font settings and before the content of the upper part.

/tcb/before upper pre\(=\langle\text{code}\rangle\) (no default)
- Prepends the given \(\langle\text{code}\rangle\) to \(/tcb/before\ upper^{P.52}\) after the color and font settings and before the content of the upper part.

/tcb/after upper app\(=\langle\text{code}\rangle\) (no default)
- Appends the given \(\langle\text{code}\rangle\) to \(/tcb/after\ upper^{P.53}\) after the content of the upper part.

/tcb/after upper pre\(=\langle\text{code}\rangle\) (no default)
- Prepends the given \(\langle\text{code}\rangle\) to \(/tcb/after\ upper^{P.53}\) after the content of the upper part.

% \tcbuselibrary{theorems}
\tcbset{ams align,% this sets 'before upper' and 'after upper'
colback=yellow!10!white, colframe=red!50!black,
before upper app={\\frac{2}{\sqrt{2}}&=\sqrt{2}.\},
after upper pre={\\sin\left(\frac{\pi}{2}\right)&=1.},
}
\begin{tcolorbox}
\sum_{n=1}^{\infty} \frac{1}{n} = \infty.\quad (23)
\int x^2 \text{d}x = \frac{1}{3} x^3 + c.\quad (24)
\sin \left( \frac{\pi}{2} \right) = 1.\quad (25)
\end{tcolorbox}
Appends the given \texttt{\langle code\rangle} to \texttt{/tcb/before lower*} \textsuperscript{P.53} after the color and font settings and before the content of the lower part.

Prepends the given \texttt{\langle code\rangle} to \texttt{/tcb/before lower*} \textsuperscript{P.53} after the color and font settings and before the content of the lower part.

Appends the given \texttt{\langle code\rangle} to \texttt{/tcb/after lower*} \textsuperscript{P.53} after the content of the lower part.

Prepends the given \texttt{\langle code\rangle} to \texttt{/tcb/after lower*} \textsuperscript{P.53} after the content of the lower part.

17.3 Embedding into the Surroundings

The following option keys extend the options given in Subsection 4.14 from page 72.

The 'hookable' versions are usable inside the document. In the preamble, they can only be used after explicit setting of \texttt{/tcb/before*} \textsuperscript{P.72} and \texttt{/tcb/after*} \textsuperscript{P.72} or by e.g. \texttt{/tcb/parskip*} \textsuperscript{P.72}.

Appends the given \texttt{\langle code\rangle} to \texttt{/tcb/before*} \textsuperscript{P.72} before the colored box.

Prepends the given \texttt{\langle code\rangle} to \texttt{/tcb/before*} \textsuperscript{P.72} before the colored box.

Appends the given \texttt{\langle code\rangle} to \texttt{/tcb/after*} \textsuperscript{P.72} after the colored box.

Prepends the given \texttt{\langle code\rangle} to \texttt{/tcb/after*} \textsuperscript{P.72} after the colored box.

```latex
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}
\begin{tcolorbox}[title=My title,before app={\texttt{The box follows:\[4pt\]}},
after app={\texttt{This is the end.}}]
This is a \texttt{tcolorbox}.
\end{tcolorbox}
```

The box follows:

\textbf{My title}

This is a \texttt{tcolorbox}.

This is the end.
17.4 Overlays

The following option keys extend the options given in Subsection 4.11 from page 61.

/tcb/overlay app=(graphical code) (no default)
Appends the given (graphical code) to /tcb/overlay \(^{P.61}\).

/tcb/overlay pre=(graphical code) (no default)
Prepends the given (graphical code) to /tcb/overlay \(^{P.61}\).

/tcb/overlay unbroken app=(graphical code) (no default)
Appends the given (graphical code) to /tcb/overlay unbroken \(^{P.62}\).

/tcb/overlay unbroken pre=(graphical code) (no default)
Prepends the given (graphical code) to /tcb/overlay unbroken \(^{P.62}\).

/tcb/overlay first app=(graphical code) (no default)
Appends the given (graphical code) to /tcb/overlay first \(^{P.62}\).

/tcb/overlay first pre=(graphical code) (no default)
Prepends the given (graphical code) to /tcb/overlay first \(^{P.62}\).

\begin{tcolorbox}[frogbox,title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[frogbox,ribbon,title=My title]
This is a \textbf{tcolorbox}.
Here, we apply a second overlay.
\end{tcolorbox}
/tcb/overlay middle app=⟨graphical code⟩ (no default)
Appends the given ⟨graphical code⟩ to /tcb/overlay middle.P.62.

/tcb/overlay middle pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/overlay middle.P.62.

/tcb/overlay last app=⟨graphical code⟩ (no default)
Appends the given ⟨graphical code⟩ to /tcb/overlay last.P.62.

/tcb/overlay last pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/overlay last.P.62.

/tcb/overlay broken app=⟨graphical code⟩ (no default)
Appends the given ⟨graphical code⟩ to /tcb/overlay broken.P.62.

/tcb/overlay broken pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/overlay broken.P.62.

/tcb/overlay unbroken and first app=⟨graphical code⟩ (no default)
Appends the given ⟨graphical code⟩ to /tcb/overlay unbroken and first.P.62.

/tcb/overlay unbroken and first pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/overlay unbroken and first.P.62.

/tcb/overlay middle and last app=⟨graphical code⟩ (no default)
Appends the given ⟨graphical code⟩ to /tcb/overlay middle and last.P.62.

/tcb/overlay middle and last pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/overlay middle and last.P.62.

/tcb/overlay unbroken and last app=⟨graphical code⟩ (no default)
Appends the given ⟨graphical code⟩ to /tcb/overlay unbroken and last.P.62.

/tcb/overlay unbroken and last pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/overlay unbroken and last.P.62.

/tcb/overlay first and middle app=⟨graphical code⟩ (no default)
Appends the given ⟨graphical code⟩ to /tcb/overlay first and middle.P.62.

/tcb/overlay first and middle pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/overlay first and middle.P.62.
17.5 Watermarks

The following option keys extend the options given in Subsection 9.3 from page 131.

Watermarks are special overlays. The \texttt{libhooks} library allows the combination of several watermarks and overlays.

\texttt{/tcb/watermark text app=(text)} \hspace{1cm} (no default)

Appends a \texttt{/tcb/watermark text P.131} to the colored box.

\begin{verbatim}
\tcset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}
\begin{tcolorbox}[enhanced,title=My title,watermark graphics=Basilica_5.png,
  watermark opacity=0.25,
  watermark text app=Basilica,watermark color=Navy
]
lipsum[1-2]
\end{tcolorbox}
\end{verbatim}

\textbf{My title}


This example uses a public domain picture from\url{http://commons.wikimedia.org/wiki/File:Basilica_5.png}

\texttt{/tcb/watermark text pre=(text)} \hspace{1cm} (no default)

Prepends a \texttt{/tcb/watermark text P.131} to the colored box.

\texttt{/tcb/watermark text app on=(part) is (text)} \hspace{1cm} (no default)

Appends a \texttt{/tcb/watermark text on P.131} the named \texttt{(part)} of a break sequence.

\texttt{/tcb/watermark text pre on=(part) is (text)} \hspace{1cm} (no default)

Prepends a \texttt{/tcb/watermark text on P.131} the named \texttt{(part)} of a break sequence.
/tcb/watermark graphics app=(file name) \quad \text{(no default)}

Appends a \textit{/tcb/watermark graphics} on P.132 referenced by (file name) to the colored box.

/tcb/watermark graphics pre=(file name) \quad \text{(no default)}

Prepends a \textit{/tcb/watermark graphics} on P.132 referenced by (file name) to the colored box.

/tcb/watermark graphics app on=(part) is (file name) \quad \text{(no default)}

Appends a \textit{/tcb/watermark graphics} on P.132 the named (part) of a break sequence. The picture is referenced by (file name).

/tcb/watermark graphics pre on=(part) is (file name) \quad \text{(no default)}

Prepends a \textit{/tcb/watermark graphics} on P.132 the named (part) of a break sequence. The picture is referenced by (file name).

/tcb/watermark tikz app=(graphical code) \quad \text{(no default)}

Appends a \textit{/tcb/watermark tikz} on P.133 with the given \textit{tikz} (graphical code) to the colored box.

/tcb/watermark tikz pre=(graphical code) \quad \text{(no default)}

Prepends a \textit{/!tcb/watermark tikz} on P.133 with the given \textit{tikz} (graphical code) to the colored box.

\begin{tcolorbox}[enhanced, title=My title, watermark text=Watermark, smiley]
\lipsum[1-2]
\end{tcolorbox}

My title


/tcb/watermark tikz app on=(part) is (graphical code) \quad \text{(no default)}

Appends a \textit{/tcb/watermark tikz} on P.133 the named (part) of a break sequence.

/tcb/watermark tikz pre on=(part) is (graphical code) \quad \text{(no default)}

Prepends a \textit{/tcb/watermark tikz} on P.133 the named (part) of a break sequence.
17.6 Underlays

The following option keys extend the options given in Section 9.8 on page 160. There are no app type keys since underlays are stackable by default.

/tcb/underlay pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay ·P.160.

/tcb/underlay unbroken pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay unbroken ·P.161.

/tcb/underlay first pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay first ·P.161.

/tcb/underlay middle pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay middle ·P.161.

/tcb/underlay last pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay last ·P.161.

/tcb/underlay boxed title pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay boxed title ·P.161.

/tcb/underlay broken pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay broken ·P.161.

/tcb/underlay unbroken and first pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay unbroken and first ·P.161.

/tcb/underlay middle and last pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay middle and last ·P.161.

/tcb/underlay unbroken and last pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay unbroken and last ·P.161.

/tcb/underlay first and middle pre=⟨graphical code⟩ (no default)
Prepends the given ⟨graphical code⟩ to /tcb/underlay first and middle ·P.161.
17.7 Finishes

The following option keys extend the options given in Section 9.9 on page 162. There are no app type keys since finishes are stackable by default.

\[ /tcb/finish \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish \(^\text{P.162}\).

\[ /tcb/finish \ unbroken \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish unbroken \(^\text{P.163}\).

\[ /tcb/finish \ first \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish first \(^\text{P.163}\).

\[ /tcb/finish \ middle \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish middle \(^\text{P.163}\).

\[ /tcb/finish \ last \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish last \(^\text{P.163}\).

\[ /tcb/finish \ broken \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish broken \(^\text{P.163}\).

\[ /tcb/finish \ unbroken \ and \ first \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish unbroken and first \(^\text{P.163}\).

\[ /tcb/finish \ middle \ and \ last \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish middle and last \(^\text{P.163}\).

\[ /tcb/finish \ unbroken \ and \ last \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish unbroken and last \(^\text{P.163}\).

\[ /tcb/finish \ first \ and \ middle \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/finish first and middle \(^\text{P.163}\).

17.8 Skin Code

The following option keys extend the options given in Subsection 8.2 from page 109.

\[ /tcb/frame \ code \ app=⟨graphical code⟩ \] (no default)
Appends the given \( ⟨graphical code⟩ \) to /tcb/frame code \(^\text{P.109}\).

\[ /tcb/frame \ code \ pre=⟨graphical code⟩ \] (no default)
Prepends the given \( ⟨graphical code⟩ \) to /tcb/frame code \(^\text{P.109}\).

\[ /tcb/interior \ titled \ code \ app=⟨graphical code⟩ \] (no default)
Appends the given \( ⟨graphical code⟩ \) to /tcb/interior titled code \(^\text{P.109}\).

/\textit{tcbox}\text{\texttt{interior\ titled\ code\ pre}}=(\textit{graphical\ code}) \hspace{1cm} \text{(no default)}

Prepends the given \textit{graphical code} to /\textit{tcbox\/interior\ titled\ code}.\textsuperscript{P.109}

/\textit{tcbox}\text{\texttt{interior\ code\ app}}=(\textit{graphical\ code}) \hspace{1cm} \text{(no default)}

Appends the given \textit{graphical code} to /\textit{tcbox\/interior\ code}.\textsuperscript{P.110}

/\textit{tcbox}\text{\texttt{interior\ code\ pre}}=(\textit{graphical\ code}) \hspace{1cm} \text{(no default)}

Prepends the given \textit{graphical code} to /\textit{tcbox\/interior\ code}.\textsuperscript{P.110}

/\textit{tcbox}\text{\texttt{segmentation\ code\ app}}=(\textit{graphical\ code}) \hspace{1cm} \text{(no default)}

Appends the given \textit{graphical code} to /\textit{tcbox\/segmentation\ code}.\textsuperscript{P.110}

/\textit{tcbox}\text{\texttt{segmentation\ code\ pre}}=(\textit{graphical\ code}) \hspace{1cm} \text{(no default)}

Prepends the given \textit{graphical code} to /\textit{tcbox\/segmentation\ code}.\textsuperscript{P.110}

/\textit{tcbox}\text{\texttt{title\ code\ app}}=(\textit{graphical\ code}) \hspace{1cm} \text{(no default)}

Appends the given \textit{graphical code} to /\textit{tcbox\/title\ code}.\textsuperscript{P.111}

/\textit{tcbox}\text{\texttt{title\ code\ pre}}=(\textit{graphical\ code}) \hspace{1cm} \text{(no default)}

Prepends the given \textit{graphical code} to /\textit{tcbox\/title\ code}.\textsuperscript{P.111}
The library is loaded by a package option or inside the preamble by:

```latex
\tcbuselibrary{xparse}
```

This also loads the package `xparse` [11].

The purpose of this library is to give comfortable access to the powerful document command production with `xparse` for `tcolorbox`. See the `xparse` package documentation [11] for details about the argument `(specification)` used in this section.

### 18.1 Option Keys

**/tcb/verbatim** *(style, no value)*

Sets options for a `verbatim` style \tcbox\textsuperscript{P.13}. Since the indented boxes may contain only very few words, the dimensions are made smaller and `/tcb/nobeforeafter`\textsuperscript{P.72} and `/tcb/tcbox raise base`\textsuperscript{P.87} are set.

\begin{verbatim}
\textbf is a \LaTeX\ command.
\end{verbatim}

**/tcb/IfNoValueTF** *(no default)*

Wraps the `\IfNoValueTF` command of `xparse` for option setting. If the `⟨argument⟩` has no value, the `⟨true options⟩` are set. Otherwise, the `⟨false options⟩` are set.

\begin{verbatim}
\textbf is a \LaTeX\ command.
\end{verbatim}
\texttt{tcb/IfValueTF=\{argument\}\{true options\}\{false options\}} \hspace{1cm} \text{(no default)}

Wraps the \texttt{IfValueTF} command of \texttt{xparse} for option setting. If the \texttt{argument} has a value, the \texttt{true options} are set. Otherwise, the \texttt{false options} are set.

---

\texttt{\DeclareTColorBox{mybox}{ o }{colframe=red!75!black,colback=red!5!white, IfValueTF={#1}{title={\textbf{#1}},fonttitle=bfseries}{}}}

\begin{mybox}
This is a tcolorbox.
\end{mybox}

\begin{mybox}[My title]
This is a tcolorbox.
\end{mybox}

---

\texttt{tcb/IfBooleanTF=\{argument\}\{true options\}\{false options\}} \hspace{1cm} \text{(no default)}

Wraps the \texttt{IfBooleanTF} command of \texttt{xparse} for option setting. If the \texttt{argument} is \texttt{BooleanTrue}, the \texttt{true options} are set. If the \texttt{argument} is \texttt{BooleanFalse}, the \texttt{false options} are set.

---

\texttt{\DeclareTColorBox{mybox}{ s }{colframe=red!75!black, IfBooleanTF={#1}{colback=yellow!50!red}{colback=red!5!white}}}

\begin{mybox}
This is a tcolorbox.
\end{mybox}

\begin{mybox}*
This is a tcolorbox.
\end{mybox}
18.2 Producing \texttt{tcolorbox} Environments and Commands

\begin{verbatim}
\DeclareTColorBox[{⟨init options⟩}]{⟨name⟩}{⟨specification⟩}{⟨options⟩}
\end{verbatim}

Creates a new environment \langle name⟩ based on \texttt{tcolorbox} \textsuperscript{P.11}.

Basically, \texttt{\DeclareTColorBox} operates like \texttt{\DeclareDocumentEnvironment}. This means, the new environment \langle name⟩ is constructed with the given argument \langle specification⟩. The \langle options⟩ are given to the underlying \texttt{tcolorbox} \textsuperscript{P.11}.

Note that /tcb/savedelimter \textsuperscript{P.24} is set to the given \langle name⟩ automatically.

The \langle init options⟩ allow setting up automatic numbering, see Section 5 from page 92.

The new environment is always created, irrespective of an already existing environment with the same name.

\begin{verbatim}
\% counter from previous example
\DeclareTColorBox[use counter from=pabox]{mybox}{ O{red} m d" O{} }
\{enhanced,colframe=#1!75!black,colback=#1!15!white,
 fonttitle={\bfseries,title={\thetcbcounter-#2},
 IfValueTF={#3}{watermark text={#3}}{},#4}\end{verbatim}

\begin{mybox}{My title}
This is a tcolorbox.
\end{mybox}

\begin{mybox}[blue]{My title}
This is a tcolorbox.
\end{mybox}

\begin{mybox}[green]{My title}"My Watermark"
This is a tcolorbox.
\end{mybox}

\begin{mybox}[yellow]{My title}[colbacktitle=yellow!50!white,coltitle=black]
This is a tcolorbox.
\end{mybox}

\begin{mybox}[purple]{My title}"All together"[coltitle=yellow]
This is a tcolorbox.
\end{mybox}
\NewTColorBox[(init options)]{(name)}{(specification)}{(options)}

Operates like \DeclareTColorBox^P.338, but based on \NewDocumentEnvironment instead of \DeclareDocumentEnvironment. An error is issued if \texttt{name} has already been defined.

\RenewTColorBox[(init options)]{(name)}{(specification)}{(options)}

Operates like \DeclareTColorBox^P.338, but based on \RenewDocumentEnvironment instead of \DeclareDocumentEnvironment. An existing environment is redefined.

\ProvideTColorBox[(init options)]{(name)}{(specification)}{(options)}

Operates like \DeclareTColorBox^P.338, but based on \ProvideDocumentEnvironment instead of \DeclareDocumentEnvironment. The environment \texttt{name} is only created if it is not already defined.
\DeclareTotalTColorBox[(init options)]{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}{\langle content\rangle}

Creates a new command \langle name\rangle based on tcolorbox \textsuperscript{P.11}. In contrast to \DeclareTColorBox \textsuperscript{P.338}, also the \langle content\rangle of the tcolorbox is specified.

Basically, \DeclareTotalTColorBox operates like \DeclareDocumentCommand. This means, the new command \langle name\rangle is constructed with the given argument \langle specification\rangle. The \langle options\rangle are given to the underlying \texttt{tcolorbox} \textsuperscript{P.11} which is filled with the specified \langle content\rangle.

Note that \texttt{/tcb/savedelimiter} \textsuperscript{P.24} is set to the given \langle name\rangle automatically.

The \langle init options\rangle allow setting up automatic numbering, see Section 5 from page 92.

The new command is always created, irrespective of an already existing command with the same name.

\begin{verbatim}
\DeclareTotalTColorBox{\diabox}{ O{} v m }
{ bicolor,nobeforeafter,equal height group=diabox,width=5.7cm,
  fonttitle=\bfseries\ttfamily,adjusted title={#2},center title,
  colframe=blue!20!black,leftupper=0mm,rightupper=0mm,colback=black!75!white,#1}
{ \tikz\path[fill zoom image={#2}] (0,0) rectangle (\linewidth,4cm);%
  \tcblower}
\end{verbatim}

\begin{verbatim}
\diabox{blueshade.png}{Created with |GIMP|.\
\url{http://www.gimp.org}}
\diabox{goldshade.png}{Created with |GIMP|.\
\url{http://www.gimp.org}}
\end{verbatim}

\NewTotalTColorBox[(init options)]{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}{\langle content\rangle}

Operates like \DeclareTotalTColorBox, but based on \NewDocumentCommand instead of \DeclareDocumentCommand. An error is issued if \langle name\rangle has already been defined.

\RenewTotalTColorBox[(init options)]{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}{\langle content\rangle}

Operates like \DeclareTotalTColorBox, but based on \RenewDocumentCommand instead of \DeclareDocumentCommand. An existing command is redefined.

\ProvideTotalTColorBox[(init options)]{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}{\langle content\rangle}

Operates like \DeclareTotalTColorBox, but based on \ProvideDocumentCommand instead of \DeclareDocumentCommand. The command \langle name\rangle is only created if it is not already defined.
18.3 Producing \texttt{tcbox} Commands

\begin{verbatim}
\DeclareTCBox[\langle init options \rangle]{\langle name \rangle}{\langle specification \rangle}{\langle options \rangle}
\end{verbatim}

Creates a new command \texttt{\langle name \rangle} based on \texttt{tcbox}. Basically, \texttt{\DeclareTCBox} operates like \texttt{\DeclareDocumentCommand}. This means, the new command \texttt{\langle name \rangle} is constructed with the given argument \texttt{\langle specification \rangle}. The \texttt{\langle options \rangle} are given to the underlying \texttt{tcbox}.

Note that \texttt{/tcb/savedelimiter} is set to the given \texttt{\langle name \rangle} automatically. The \texttt{\langle init options \rangle} allow setting up automatic numbering, see Section 5 from page 92. The new command is always created, irrespective of an already existing command with the same name.

% counter from previous example
\begin{verbatim}
\DeclareTCBox[use counter from=pabox]{\mybox}{ s m s }
\{ nobeforeafter,colback=red!5!white,colframe=red!75!black,
  title={#2 (Box \thetcbcounter)},fonttitle=\bfseries,
  IfBooleanTF={#1}{enhanced,drop shadow}{},
  IfBooleanTF={#3}{colbacktitle=red!50!white}{ } \}
\end{verbatim}

\begin{verbatim}
\mybox{Bird}{This is my first box.} \hfill \mybox*{Tree}{This is my second box.} \par \bigskip
\mybox{Bike}{This is my third box.} \hfill \mybox*{City}{This is my fourth box.}
\end{verbatim}

\begin{verbatim}
\NewTCBox[\langle init options \rangle]{\langle name \rangle}{\langle specification \rangle}{\langle options \rangle}
\end{verbatim}

Operates like \texttt{\DeclareTCBox}, but based on \texttt{\NewDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. An error is issued if \texttt{\langle name \rangle} has already been defined.

\begin{verbatim}
\RenewTCBox[\langle init options \rangle]{\langle name \rangle}{\langle specification \rangle}{\langle options \rangle}
\end{verbatim}

Operates like \texttt{\DeclareTCBox}, but based on \texttt{\RenewDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. An existing command is redefined.

\begin{verbatim}
\ProvideTCBox[\langle init options \rangle]{\langle name \rangle}{\langle specification \rangle}{\langle options \rangle}
\end{verbatim}

Operates like \texttt{\DeclareTCBox}, but based on \texttt{\ProvideDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. The command \texttt{\langle name \rangle} is only created if it is not already defined.
\DeclareTotalTCBox{\myverb}{ O{red} v O{} }
{ fontupper=\ttfamily,nobeforeafter,tcbox raise base,arc=0pt,outer arc=0pt,
top=0pt,bottom=0pt,left=0mm,right=0mm,
leftrule=0pt,rightrule=0pt,toprule=0.3mm,bottomrule=0.3mm,boxsep=0.5mm,
colback=#1!10!white,colframe=#1!50!black,#3}{#2}

To set a word \textbf{bold} in \myverb{\LaTeX}, one uses \myverb[green]{\textbf{bold}}. Alternatively, write \myverb[yellow]{{\bfseries bold}}. In \myverb[blue]{\LaTeX}[enhanced,fuzzy halo], other font settings are done in the same way, e.g. \myverb{\textit}, \myverb{\itshape}\ or \myverb{\texttt}, \myverb{\ttfamily}.

The next example uses \lstinline from the listings package to typeset the verbatim content.

\begin{lstlisting}[language=command.com,keywordstyle=\color{blue!35!white}\bfseries]
\commandbox*{cd "My Documents"} changes to directory \commandbox{My Documents}.
\commandbox*{dir /A} lists the directory content.
\commandbox*{copy example.txt d:\target} copies \commandbox{example.txt} to \commandbox{d:\target}.
\end{lstlisting}

\begin{itemize}
  \item \texttt{cd "My Documents"} changes to directory \texttt{My Documents}.
  \item \texttt{dir /A} lists the directory content.
  \item \texttt{copy example.txt d:\target} copies \texttt{example.txt} to \texttt{d:\target}.
\end{itemize}
\NewTotalTCBox[(init options)]{\langle name \rangle}{\{specification\}}{\{options\}}{\langle content \rangle}

Operates like \DeclareTotalTCBox\[^{P.342}\], but based on \NewDocumentCommand instead of \DeclareDocumentCommand. An error is issued if \langle name \rangle has already been defined.

\RenewTotalTCBox[(init options)]{\langle name \rangle}{\{specification\}}{\{options\}}{\langle content \rangle}

Operates like \DeclareTotalTCBox\[^{P.342}\], but based on \RenewDocumentCommand instead of \DeclareDocumentCommand. An existing command is redefined.

\ProvideTotalTCBox[(init options)]{\langle name \rangle}{\{specification\}}{\{options\}}{\langle content \rangle}

Operates like \DeclareTotalTCBox\[^{P.342}\], but based on \ProvideDocumentCommand instead of \DeclareDocumentCommand. The command \langle name \rangle is only created if it is not already defined.

\tcboxverb[(options)]{\langle verbatim box content \rangle}

Creates a colored box based on \tcbox\[^{P.13}\] which is fitted to the width of the given \langle verbatim box content \rangle. The underlying \tcbox\[^{P.13}\] is styled with /tcb/verbatim\[^{P.336}\] plus the given \langle options \rangle. The difference to \tcbox\[^{P.13}\] is that the \langle verbatim box content \rangle is interpreted verbatim. Therefore, \tcboxverb acts similar to \verb.

\tcboxverb{\LaTeX}, \tcboxverb[colback=blue!10!white, colupper=blue]{\LaTeX}, \tcboxverb[blank, fuzzy halo]{\LaTeX}, \tcboxverb[beamer]{\LaTeX}, \tcboxverb[enhanced, skin=enhancedmiddle jigsaw, colframe=red]{\LaTeX}. 

\LaTeX, \LaTeX, \LaTeX, \LaTeX, \LaTeX.
18.4 Producing \texttt{tcblisting} Environments

The following commands need the \texttt{listings} library to be included.

\begin{quote}
\texttt{\textbackslash DeclareTCBListing}\[\langle\textit{init options}\rangle\}\{\langle\textit{name}\rangle\}\{\langle\textit{specification}\rangle\}\{\langle\textit{options}\rangle\}
\end{quote}

Creates a new environment \textit{(name)} based on \texttt{tcblisting}.  

Basically, \texttt{\textbackslash DeclareTCBListing} operates like \texttt{\textbackslash DeclareDocumentEnvironment}.  This means, the new environment \textit{(name)} is constructed with the given argument \textit{(specification)}.  

The \textit{(options)} are given to the underlying \texttt{tcblisting}.  Note that \texttt{/tcb/savedelimiter} is set to the given \textit{(name)} automatically. 

The new environment is always created, irrespective of an already existing environment with the same name.

\begin{quote}
\texttt{\textbackslash DeclareTCBListing}\{\textit{mybox}\}\{\textit{\textbackslash \texttt{\textbackslash LaTeX} box.}\}\{\textit{\textbackslash \texttt{\textbackslash LaTeX} box.}\}
\end{quote}

\begin{quote}
\texttt{\textbackslash NewTCBListing}\[\langle\textit{init options}\rangle\]\{\langle\textit{name}\rangle\}\{\langle\textit{specification}\rangle\}\{\langle\textit{options}\rangle\}
\end{quote}

Operates like \texttt{\textbackslash DeclareTCBListing}, but based on \texttt{\textbackslash NewDocumentEnvironment} instead of \texttt{\textbackslash DeclareDocumentEnvironment}.  An error is issued if \textit{(name)} has already been defined.

\begin{quote}
\texttt{\textbackslash RenewTCBListing}\[\langle\textit{init options}\rangle\]\{\langle\textit{name}\rangle\}\{\langle\textit{specification}\rangle\}\{\langle\textit{options}\rangle\}
\end{quote}

Operates like \texttt{\textbackslash DeclareTCBListing}, but based on \texttt{\textbackslash RenewDocumentEnvironment} instead of \texttt{\textbackslash DeclareDocumentEnvironment}.  An existing environment is redefined.

\begin{quote}
\texttt{\textbackslash ProvideTCBListing}\[\langle\textit{init options}\rangle\]\{\langle\textit{name}\rangle\}\{\langle\textit{specification}\rangle\}\{\langle\textit{options}\rangle\}
\end{quote}

Operates like \texttt{\textbackslash DeclareTCBListing}, but based on \texttt{\textbackslash ProvideDocumentEnvironment} instead of \texttt{\textbackslash DeclareDocumentEnvironment}.  The environment \textit{(name)} is only created if it is not already defined.
Caveats of using an environment ending with an optional argument

\DeclareTCBListing{mybox}{ O{} }{listing only,#1}

\begin{mybox}[colframe=red] \good \end{mybox}

\begin{mybox}[colframe=red]\good\end{mybox}

\begin{mybox} \good \end{mybox}

\begin{mybox} \good \end{mybox}

\begin{mybox} \bad! \end{mybox}

\begin{mybox} \good \end{mybox}

\begin{mybox} \good \end{mybox}

\begin{mybox} \bad! \end{mybox}

\begin{mybox} \bad! \end{mybox}
18.5 Producing \texttt{tcbinputlisting} Commands

The following commands need the \texttt{listings} library to be included.

\begin{verbatim}
\DeclareTCBInputListing{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}
\end{verbatim}

Creates a new command \texttt{\langle name\rangle} based on \texttt{tcbinputlisting} \textsuperscript{P.236}. Basically, \texttt{\DeclareTCBInputListing} operates like \texttt{\DeclareDocumentCommand}. This means, the new command \texttt{\langle name\rangle} is constructed with the given argument \texttt{\langle specification\rangle}. The \texttt{\langle options\rangle} are given to the underlying \texttt{tcbinputlisting} \textsuperscript{P.236}.

The \texttt{\langle init options\rangle} allow setting up automatic numbering, see Section 5 from page 92. The new command is always created, irrespective of an already existing command with the same name.

\begin{verbatim}
% counter from previous example
\DeclareTCBInputListing[use counter from=pabox]{\mylisting}{0}{0(red) m }
% listing file={#3},title=Listing-\thetcbcounter,
colback=#2!15!white,colframe=#2!50!black,colbacktitle=#2!75!black,
fonttitle=\bfseries,listing only,#1
\end{verbatim}

\begin{verbatim}
\mylisting[before upper=\textit{This is the included file content:}]
[blue]{\jobname.tcbtemp}
\end{verbatim}

\texttt{\NewTCBInputListing{\langle init options\rangle}{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}}

Operates like \texttt{\DeclareTCBInputListing}, but based on \texttt{\NewDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. An error is issued if \texttt{\langle name\rangle} has already been defined.

\texttt{\RenewTCBInputListing{\langle init options\rangle}{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}}

Operates like \texttt{\DeclareTCBInputListing}, but based on \texttt{\RenewDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. An existing command is redefined.

\texttt{\ProvideTCBInputListing{\langle init options\rangle}{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}}

Operates like \texttt{\DeclareTCBInputListing}, but based on \texttt{\ProvideDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. The command \texttt{\langle name\rangle} is only created if it is not already defined.
18.6 Producing \texttt{tboxfit} Commands

The following commands need the \texttt{fitting} library to be included.

\begin{verbatim}
\DeclareTCBoxFit{\langle init options\rangle}{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}
\end{verbatim}

Creates a new command \texttt{\langle name\rangle} based on \texttt{tcboxfit} \textsuperscript{P.315}. Basically, \texttt{\DeclareTCBoxFit} operates like \texttt{\DeclareDocumentCommand}. This means, the new command \texttt{\langle name\rangle} is constructed with the given argument \texttt{\langle specification\rangle}. The \texttt{\langle options\rangle} are given to the underlying \texttt{tcboxfit} \textsuperscript{P.315}.

Note that /tcb/savedelimiter \textsuperscript{P.24} is set to the given \texttt{\langle name\rangle} automatically. The \texttt{\langle init options\rangle} allow setting up automatic numbering, see Section 5 from page 92. The new command is always created, irrespective of an already existing command with the same name.

\begin{verbatim}
\usepackage{lipsum}
\DeclareTCBoxFit{\mybox}{O{} m o}{colback=red!5!white, colframe=red!75!black, width=#2,height=#2/3*2, IfValueTF={#3}{height=#3}{}, #1}
\mybox[colback=yellow]{5cm}\lipsum[2]
\mybox[colback=yellow]{5cm}[4cm]\lipsum[2]
\end{verbatim}

\begin{verbatim}
\NewTCBoxFit{\langle init options\rangle}{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}
\end{verbatim}

Operates like \texttt{\DeclareTCBoxFit}, but based on \texttt{\NewDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. An error is issued if \texttt{\langle name\rangle} has already been defined.

\begin{verbatim}
\RenewTCBoxFit{\langle init options\rangle}{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}
\end{verbatim}

Operates like \texttt{\DeclareTCBoxFit}, but based on \texttt{\RenewDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. An existing command is redefined.

\begin{verbatim}
\ProvideTCBoxFit{\langle init options\rangle}{\langle name\rangle}{\langle specification\rangle}{\langle options\rangle}
\end{verbatim}

Operates like \texttt{\DeclareTCBoxFit}, but based on \texttt{\ProvideDocumentCommand} instead of \texttt{\DeclareDocumentCommand}. The command \texttt{\langle name\rangle} is only created if it is not already defined.
\DeclareTotalTCBoxFit\newcommand{\multibox}{\nobeafter\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{\foreach \n in {1,...,\#3} { \#4}}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{example.png}
\caption{Example of \texttt{\multibox} command usage.}
\end{figure}

\newcommand{\multibox}{\nobeafter\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{\foreach \n in {1,...,\#3} { \#4}}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{example.png}
\caption{Example of \texttt{\multibox} command usage.}
\end{figure}

\NewTotalTCBoxFit\newcommand{\multibox}{\nobeafter\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{\foreach \n in {1,...,\#3} { \#4}}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{example.png}
\caption{Example of \texttt{\multibox} command usage.}
\end{figure}

\RenewTotalTCBoxFit\newcommand{\multibox}{\nobeafter\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{\foreach \n in {1,...,\#3} { \#4}}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{example.png}
\caption{Example of \texttt{\multibox} command usage.}
\end{figure}

\ProvideTotalTCBoxFit\newcommand{\multibox}{\nobeafter\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{\foreach \n in {1,...,\#3} { \#4}}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}{nobeforeafter,\textbackslash{}colback=red!5!white,\textbackslash{}colframe=red!75!black,\textbackslash{}width=\#2,\textbackslash{}height=\#2/3*2,\textbackslash{}valign=center,\#1}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{example.png}
\caption{Example of \texttt{\multibox} command usage.}
\end{figure}

\end{document}
19 Library documentation

This library has the single purpose to support \LaTeX{} package documentations like this one. Actually, the visual nature follows the approach from Till Tantau’s \texttt{pgf} \cite{pgf} documentation. Typically, this library is assumed to be used in conjunction with the class \texttt{ltxdoc} or alike.

The library is loaded by a package option or inside the preamble by:

\begin{verbatim}
\tcbuselibrary{documentation}
\end{verbatim}

This also loads the library \texttt{listings}, see Section 13 on page 233, the library \texttt{skins}, see Section 9 on page 117, the library \texttt{xparse}, see Section 18 on page 336, and a bunch of packages, namely \texttt{doc}, \texttt{pifont}, \texttt{marvosym}, \texttt{makeidx}, \texttt{marginnote}, \texttt{refcount}, and \texttt{hyperref}.

The package \texttt{makeidx} is loaded only, if \texttt{\printindex} is not already defined. Therefore, one can include an alternative to \texttt{makeidx} like \texttt{imakeidx before} the library \texttt{documentation} is used.

For UTF-8 support, load:

\begin{verbatim}
\tcbuselibrary{listingsutf8,documentation}
\end{verbatim}

For \texttt{minted} \cite{minted} support, load:

\begin{verbatim}
\tcbuselibrary{documentation,minted}
\tcbset{listing engine=minted}
\end{verbatim}

19.1 Macros of the Library

\begin{verbatim}
\begin{docCommand}{⟨options⟩}{⟨name⟩}{⟨parameters⟩}
⟨command description⟩
\end{docCommand}
\end{verbatim}

Documents a \LaTeX{} macro with given \langle name \rangle where \langle name \rangle is written without backslash. The given \langle options \rangle are set with \texttt{\tcbsset}. This macro takes mandatory or optional \langle parameters \rangle. It is automatically indexed and can be referenced with \texttt{\refCom\langle name \rangle}.

\begin{verbatim}
\begin{docCommand}{foonamedocSubKey}{\marg{name}}{\marg{key path}}
  Creates a new environment \texttt{\meta{name}} based on \texttt{\refEnv{docKey}} for the documentation of keys with the given \texttt{\meta{key path}}.
\end{docCommand}
\end{verbatim}

\begin{verbatim}
\foonamedocSubKey\langle name \rangle\langle key path \rangle
  Creates a new environment \texttt{\langle name \rangle} based on \texttt{\docKey} for the documentation of keys with the given \texttt{\langle key path \rangle}.
\end{verbatim}

\begin{verbatim}
\begin{docCommand}{foonamedocSubKey*}{\marg{name}}{\marg{key path}}\%
  \foonamedocSubKey\langle name \rangle\langle key path \rangle
  \foonamedocSubKey\langle name \rangle\langle key path \rangle
  \foonamedocSubKey\langle name \rangle\langle key path \rangle
\end{docCommand}
\end{verbatim}

\begin{verbatim}
\foonamedocSubKey\langle name \rangle\langle key path \rangle
  Creates a new environment \texttt{\foonamedocSubKey} for the documentation of keys with the given \texttt{\foonamedocSubKey}.
\end{verbatim}

\begin{verbatim}
\foonamedocSubKey\langle name \rangle\langle key path \rangle
  Creates a new environment \texttt{\foonamedocSubKey} for the documentation of keys with the given \texttt{\foonamedocSubKey}.
\end{verbatim}

\begin{verbatim}
\foonamedocSubKey*\langle name \rangle\langle key path \rangle
  Creates a new environment \texttt{\foonamedocSubKey*} for the documentation of keys with the given \texttt{\foonamedocSubKey*}.
\end{verbatim}
\begin{docCommand*}\{\langle options\rangle\}\{\langle name\rangle\}\{\langle parameters\rangle\}
\end{docCommand*}

Identical to \texttt{docCommand}^{P.349}, but without index entry.

\begin{docEnvironment*}\{\langle options\rangle\}\{\langle name\rangle\}\{\langle parameters\rangle\}
\end{docEnvironment*}

Documents a \LaTeX\ environment with given \langle name\rangle. The given \langle options\rangle are set with \texttt{\tcbsset}^{P.12}. This environment takes mandatory or optional \langle parameters\rangle. It is automatically indexed and can be referenced with \texttt{\refEnv}^{P.356}\{\langle name\rangle\}.

\begin{docEnvironment*}\%[doclang/environment content=My content text]\%\{\langle options\rangle\}\{\langle name\rangle\}\{\langle parameters\rangle\}
\end{docEnvironment*}

Documents a \LaTeX\ environment with given \langle name\rangle. The given \langle options\rangle are set with \texttt{\tcbsset}^{P.12}. This environment takes mandatory or optional \langle parameters\rangle. It is automatically indexed and can be referenced with \texttt{\refEnv}^{P.356}\{\langle name\rangle\}.

\begin{docKey}\{\langle key path\rangle\}\{\langle options\rangle\}\{\langle name\rangle\}\{\langle parameters\rangle\}\{\langle description\rangle\}
\end{docKey}

Documents a key with given \langle name\rangle and an optional \langle key path\rangle. The given \langle options\rangle are set with \texttt{\tcbsset}^{P.12}. This key takes mandatory or optional \langle parameters\rangle as value with a short \langle description\rangle. It is automatically indexed and can be referenced with \texttt{\refKey}^{P.357}\{\langle name\rangle\}.
\begin{docKey*}[⟨key path⟩]{⟨name⟩}{⟨parameters⟩}{⟨description⟩}

Identical to \texttt{docKey} \textsuperscript{P.350}, but without index entry.

\end{docKey*}

\begin{docValue*}{⟨name⟩}

Documents a value with given \texttt{⟨name⟩}. Typically, this is a value for a key. This value is automatically indexed.

\begin{quote}
A feasible value for \texttt{\refKey{/foo/footitle}} is \texttt{\docValue{foovalue}}.

A feasible value for \texttt{/foo/footitle \textsuperscript{P.350}} is \texttt{foovalue}.
\end{quote}

\end{docValue*}

\begin{docValue}{⟨name⟩}

Documents a value with given \texttt{⟨name⟩}. Typically, this is a value for a key. This value is automatically indexed.

\begin{quote}
A feasible value for \texttt{\refKey{/foo/footitle}} is \texttt{\docValue{foovalue}}.

A feasible value for \texttt{/foo/footitle \textsuperscript{P.350}} is \texttt{foovalue}.
\end{quote}

\end{docValue}

\begin{docValue*}{⟨name⟩}

Identical to \texttt{docValue}, but without index entry.

\end{docValue*}

\begin{docAuxCommand}{⟨name⟩}

Documents an auxiliary or minor \LaTeX macro with given \texttt{⟨name⟩} where \texttt{⟨name⟩} is written without slashbackslash. This macro is automatically indexed.

\begin{quote}
The macro \texttt{\docAuxCommand{fooaux}} holds some interesting data.

The macro \texttt{fooaux} holds some interesting data.
\end{quote}

\end{docAuxCommand}

\begin{docAuxCommand*}{⟨name⟩}

Identical to \texttt{docAuxCommand}, but without index entry.

\end{docAuxCommand*}

\begin{docAuxEnvironment}{⟨name⟩}

Documents an auxiliary or minor \LaTeX environment with given \texttt{⟨name⟩}. This macro is automatically indexed.

\begin{quote}
The environment \texttt{\docAuxEnvironment{fooauxenv}} holds some interesting data.

The environment \texttt{fooauxenv} holds some interesting data.
\end{quote}

\end{docAuxEnvironment}

\begin{docAuxEnvironment*}[⟨key path⟩]{⟨name⟩}

Identical to \texttt{docAuxEnvironment}, but without index entry.

\end{docAuxEnvironment*}

\begin{docAuxKey}[⟨key path⟩]{⟨name⟩}

Documents an auxiliary key with given \texttt{⟨name⟩} and an optional \texttt{⟨key path⟩}. It is automatically indexed.

\begin{quote}
The key \texttt{\docAuxKey[foo]{fooaux}} holds some interesting data.

The key \texttt{/foo/fooaux} holds some interesting data.
\end{quote}

\end{docAuxKey}

\begin{docAuxKey*}[⟨key path⟩]{⟨name⟩}

Identical to \texttt{docAuxKey}, but without index entry.

\end{docAuxKey*}
\texttt{\textbackslash docCounter\{(name)\}}
Documents a counter with given \texttt{(name)}. The counter is automatically indexed.

The counter \texttt{\textbackslash docCounter\{foocounter\}} can be used for computation.

The counter \texttt{foocounter} can be used for computation.

\texttt{\textbackslash docCounter\*(\{name\})}
Identical to \texttt{\textbackslash docCounter}, but without index entry.

\texttt{\textbackslash docLength\{(name)\}}
Documents a counter with given \texttt{(name)}. The counter is automatically indexed.

The length \texttt{\textbackslash docLength\{foolength\}} can be used for computation.

The length \texttt{foolength} can be used for computation.

\texttt{\textbackslash docLength\*(\{name\})}
Identical to \texttt{\textbackslash docLength}, but without index entry.

\texttt{\textbackslash docColor\{(name)\}}
Documents a color with given \texttt{(name)}. The color is automatically indexed.

The color \texttt{\textbackslash docColor\{foocolor\}} is available.

The color \texttt{foocolor} is available.

\texttt{\textbackslash docColor\*(\{name\})}
Identical to \texttt{\textbackslash docColor}, but without index entry.
\cs\{(name)\}
Macro from ltxdoc [3] to typeset a command word ⟨name⟩ where the backslash is prefixed. The library overwrites the original macro.

| This is a \cs\{foocommand\}. |
| This is a \foocommand. |

\meta\{(text)\}
Macro from doc [8] to typeset a meta ⟨text⟩. The library overwrites the original macro.

| This is a \meta\{text\}. |
| This is a ⟨text⟩. |

\marg\{(text)\}
Macro from ltxdoc [3] to typeset a ⟨text⟩ with curly brackets as a mandatory argument. The library overwrites the original macro.

| This is a mandatory \marg\{argument\}. |
| This is a mandatory ⟨argument⟩. |

\oarg\{(text)\}
Macro from ltxdoc [3] to typeset a ⟨text⟩ with square brackets as an optional argument. The library overwrites the original macro.

| This is an optional \oarg\{argument\}. |
| This is an optional ⟨argument⟩. |

\brackets\{(text)\}
Sets the given ⟨text⟩ with curly brackets.

| Here we use \brackets\{some text\}. |
| Here we use ⟨some text⟩. |
\begin{dispExample}
\begin{tcolorbox}
This is a \LaTeX\ example.
\end{tcolorbox}
\end{dispExample}

This is a \LaTeX\ example.

This is a \LaTeX\ example.

\begin{dispExample*}(options)}\begin{tcolorbox}
This is a \LaTeX\ example.
\end{tcolorbox}\end{dispExample*}

The starred version of dispExample takes tcolorbox as parameter. These \LaTeX\ example.

This is a \LaTeX\ example.

This is a \LaTeX\ example.

These \LaTeX\ example.

This is a \LaTeX\ example.
\begin{dispListing}
(environment content)
\end{dispListing}

Creates a colored box based on a \texttt{tcolorbox} \textsuperscript{P.11}. It displays the environment content as source code. The appearance is controlled by \texttt{/tcb/documentation listing style} \textsuperscript{P.359} and the style \texttt{/tcb/docexample} \textsuperscript{P.359}. It may be changed by redefining this style.

\begin{dispListing}
\begin{verbatim}
This is a \LaTeX\ example.
\end{verbatim}
\end{dispListing}

This is a \LaTeX\ example.

\begin{dispListing*}{(options)}
(environment content)
\end{dispListing*}

The starred version of \texttt{dispListing} takes \texttt{tcolorbox} \textsuperscript{P.11} \langle \texttt{options} \rangle as parameter. These \langle \texttt{options} \rangle are executed after \texttt{/tcb/docexample} \textsuperscript{P.359}.

\begin{dispListing*}{title=My listing}
\begin{verbatim}
This is a \LaTeX\ example.
\end{verbatim}
\end{dispListing*}

My listing

This is a \LaTeX\ example.

\begin{absquote}
\begin{verbatim}
\mid|tcolorbox| provides an environment for colored and framed text boxes with a heading line. Optionally, such a box can be split in an upper and a lower part.
\end{verbatim}
\end{absquote}

\texttt{tcolorbox} provides an environment for colored and framed text boxes with a heading line. Optionally, such a box can be split in an upper and a lower part.
\tcbmakedocSubKey\langle name\rangle\langle key path\rangle

Creates a new environment \langle name\rangle based on \texttt{docKey}\textsuperscript{P.350} for the documentation of keys with the given \langle key path\rangle as default. The new environment \langle name\rangle takes the same parameters as \texttt{docKey}\textsuperscript{P.350} itself. A second starred environment \langle name\rangle is also created, which is identical to \langle name\rangle but without index entry.

\begin{tcbmakedocSubKey}{docFooKey}{foo}
\begin{docFooKey}{foodummy}{=\texttt{\meta\{nothing\}}}{no default, initially empty}
Some key.
\end{docFooKey}
\begin{docFooKey*}{foo another dummy}{=\texttt{\meta\{nothing\}}}{no default, initially empty}
Some key (not indexed).
\end{docFooKey*}
\end{tcbmakedocSubKey}

\refCom\langle name\rangle

References a documented \LaTeX{} macro with given \langle name\rangle where \langle name\rangle is written without backslash. The page reference is suppressed if it links to the same page.

We have created \refCom\texttt{foomakedocSubKey} as an example.

We have created \texttt{foomakedocSubKey P.349} as an example.

\refCom*\langle name\rangle

References a documented \LaTeX{} macro with given \langle name\rangle where \langle name\rangle is written without backslash. There is no page reference.

We have created \refCom*\texttt{foomakedocSubKey} as an example.

\refEnv\langle name\rangle

References a documented \LaTeX{} environment with given \langle name\rangle. The page reference is suppressed if it links to the same page.

We have created \refEnv\texttt{foocolorbox} as an example.

We have created \texttt{foocolorbox P.350} as an example.

\refEnv*\langle name\rangle

References a documented \LaTeX{} environment with given \langle name\rangle. There is no page reference.

We have created \refEnv*\texttt{foocolorbox} as an example.

We have created \texttt{foocolorbox} as an example.
\refKey\{(name)\}  
References a documented key with given \(name\) where \(name\) is the full path name of the key. The page reference is suppressed if it links to the same page.

<table>
<thead>
<tr>
<th>We have created \refKey{/foo/footitle} as an example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have created /foo/footitle (\text{\textsuperscript{P.350}}) as an example.</td>
</tr>
</tbody>
</table>

\refKey*\{(name)\}  
References a documented key with given \(name\) where \(name\) is the full path name of the key. There is no page reference.

<table>
<thead>
<tr>
<th>We have created \refKey*/{foo/footitle} as an example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have created /foo/footitle as an example.</td>
</tr>
</tbody>
</table>

\refAux\{(name)\}  
References some auxiliary environment, key, value, or color. The hyperlink color is used, but there is no real link.

<table>
<thead>
<tr>
<th>Some pages back, one can see \refAux{/foo/footitle} as an example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some pages back, one can see /foo/footitle as an example.</td>
</tr>
</tbody>
</table>

\refAuxcs\{(name)\}  
References some auxiliary macro \(name\) where \(name\) is written without backslash. The hyperlink color is used, but there is no real link.

<table>
<thead>
<tr>
<th>Some pages back, one can see \refAuxcs{fooaux} as an example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some pages back, one can see fooaux as an example.</td>
</tr>
</tbody>
</table>

\colDef\{(text)\}  
Sets \(text\) with the command color, see /tcb/color command \(\text{\textsuperscript{P.361}}\).

<table>
<thead>
<tr>
<th>This is my \colDef{text}.</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is my text.</td>
</tr>
</tbody>
</table>

\colOpt\{(text)\}  
Sets \(text\) with the option color, see /tcb/color option \(\text{\textsuperscript{P.361}}\).

<table>
<thead>
<tr>
<th>This is my \colOpt{text}.</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is my text.</td>
</tr>
</tbody>
</table>
\ tcbdocmarginnote\langle options\rangle\langle text\rangle

Creates a tcolorbox note with the given \langle text\rangle inside the margin using the marginnote package. The style of the tcolorbox is predefined and can be altered by /tcb/doc marginnote *P.365 and the given \langle options\rangle.

Some text\ tcbdocmarginnote\langle text\rangle which is commented by a note inside the margin. Alternatively to |\ tcbdocmarginnote|, you can always use |\ marginnote| with a |tcolorbox| directly.\par
This is further text\ \ tcbdocmarginnote\langle options\rangle\langle text\rangle with another note.

Some text which is commented by a note inside the margin. Alternatively to \ tcbdocmarginnote, you can always use |\ marginnote| with a |tcolorbox| directly.\par
This is further text with another note.

\ tcbdocnew\langle date\rangle

Auxiliary macro which typesets the /tcb/doclang/new *P.362 text with the given \langle date\rangle. It may be redefined for customization.

\ tcbdocnew\langle date\rangle.\par
\% Next one is displayed in the margin:\par
|\ tcbdocmarginnote|\langle \ tcbdocnew\langle date\rangle\rangle |


\ tcbdocupdated\langle date\rangle

Auxiliary macro which typesets the /tcb/doclang/updated *P.362 text with the given \langle date\rangle. It may be redefined for customization.

\ tcbdocupdated\langle date\rangle. Updated: 2014-09-19.
19.2  Option Keys of the Library

/tcb/docexample  
Sets the style for dispExample "P.354" and dispListing "P.355" with the colors ExampleBack and ExampleFrame. To change the appearance of the examples, this style can be redefined.

/tcb/documentation listing options={(key list)}  
Sets the options from the package listings [6]. They are used inside dispExample "P.354" and dispListing "P.355" to typeset the listings. Note that this is not identical to the key /tcb/listing options "P.240" which is used for 'normal' listings.
Used for /tcb/listing engine "P.245=listings only.

/tcb/documentation listing style={(listing style)}  
Abbreviation for documentation listing options={(style=...}. This key sets a ⟨style⟩ for the listings package, see [6]. Note that this is not identical to the key /tcb/listing style "P.240" which is used for 'normal' listings.
Used for /tcb/listing engine "P.245=listings only.

/tcb/documentation minted style={(key list)}  
Sets a ⟨style⟩ known to Pygments [12] for the package minted [14], if used. Note that this is not identical to the key /tcb/minted style "P.244" which is used for 'normal' listings.
Used for /tcb/listing engine "P.245=minted only.

/tcb/documentation minted options={(minted style)}  
Sets the options from the package minted [14] which are used during typesetting of the listing, if used. Note that this is not identical to the key /tcb/minted options "P.243" which is used for 'normal' listings.
Used for /tcb/listing engine "P.245=minted only.

/tcb/before example={(macros)}  
Sets the ⟨macros⟩ which are executed before dispExample "P.354" and dispListing "P.355" additional to /tcb/before "P.72.

/tcb/after example={(macros)}  
Sets the ⟨macros⟩ which are executed after dispExample "P.354" and dispListing "P.355" additional to /tcb/after "P.72.
/tcb/index command=(macro) (no default, initially \index)
Replaces the internally used \index macro by the given ⟨macro⟩. The ⟨macro⟩ has to take one mandatory argument like \index. This option is mutually exclusive with /tcb/index command name.
\tcbset{index command=myindex_command}

/tcb/index command name=(name) (no default, initially unset)
Replaces the internally used \index macro by \index[⟨name⟩], i.e. \index{...} is replaced by \index[⟨name⟩]{...}. This option is intended to be used with \imakeidx{} and is mutually exclusive with /tcb/index command name.
\tcbset{index command name=mydoc}

/tcb/index format=(format) (no default, initially pgf)
Determines the basic ⟨format⟩ of the generated index. Feasible values are:
- \p gfsection: The index is formatted like in the \p gf documentation (as a section).
- \p gfc hapter: The index is formatted like in the \p gf documentation (as a chapter).
- \p gf: Alias for \p gfsection.
- \doc: The index is assumed to be formatted by \doc or \ltxdoc. The usage of \makeindex{} with \-s gind.ist is assumed. The package \hypdoc{} has to be loaded before \tcolorbox{}.
- \off: The index is not formatted by \tcolorbox. Use this, if the index is formatted by another package like \imakeidx{}.

/tcb/index actual=(character) (no default, initially @)
Sets the character for 'actual' in automatic indexing.

/tcb/index quote=(character) (no default, initially ”)
Sets the character for 'quote' in automatic indexing.

/tcb/index level=(character) (no default, initially !)
Sets the character for 'level' in automatic indexing.

/tcb/index default settings (style, no value)
Sets the \makeindex{} default values for /tcb/index actual, /tcb/index quote, and /tcb/index level.

/tcb/index german settings (style, no value)
Sets the \makeindex{} values recommended for German language texts. This is identical to setting the following:
\tcbset{index actual=\=,index quote=!\=,index level=\{\>}}
/tcb/index annotate=true|false (default true, initially true)
If set to true, the index entries are annotated with short descriptions given by
/tcb/doclang/environment P.362, /tcb/doclang/key P.362, and others.

/tcb/index colorize=true|false (default true, initially false)
If set to true, the index entries colorized according to the color settings given by /tcb/color
environment, /tcb/color key, and others.

/tcb/color command=(color) (no default, initially Definition)
Sets the highlight color used by macro definitions.

/tcb/color environment=(color) (no default, initially Definition)
Sets the highlight color used by environment definitions.

/tcb/color key=(color) (no default, initially Definition)
Sets the highlight color used by key definitions.

/tcb/color value=(color) (no default, initially Definition)
Sets the highlight color used by value definitions.

/tcb/color counter=(color) (no default, initially Definition)
Sets the highlight color used by counter definitions.

/tcb/color length=(color) (no default, initially Definition)
Sets the highlight color used by length definitions.

/tcb/color color=(color) (no default, initially Definition)
Sets the highlight color used by color definitions.

/tcb/color definition=(color) (no default, initially Definition)
Sets the highlight color for /tcb/color command, /tcb/color environment, /tcb/color
key, /tcb/color value, /tcb/color counter, /tcb/color length, and /tcb/color
color.

/tcb/color option=(color) (no default, initially Option)
Sets the color used for optional arguments.

/tcb/color hyperlink=(color) (no default, initially Hyperlink)
Sets the color for all hyper-links, i.e. all internal and external links.
The following keys are provided for language specific settings. The English language is pre-defined.

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>/tcb/english language</td>
<td>(style, no value)</td>
</tr>
<tr>
<td>Sets all language specific settings to English.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/color=text</td>
<td>(no default, initially color)</td>
</tr>
<tr>
<td>Text used in the index for colors.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/colors=text</td>
<td>(no default, initially Colors)</td>
</tr>
<tr>
<td>Heading text in the index for colors.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/counter=text</td>
<td>(no default, initially counter)</td>
</tr>
<tr>
<td>Text used in the index for counters.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/counters=text</td>
<td>(no default, initially Counters)</td>
</tr>
<tr>
<td>Heading text in the index for counters.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/environment=text</td>
<td>(no default, initially environment)</td>
</tr>
<tr>
<td>Text used in the index for environments.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/environments=text</td>
<td>(no default, initially Environments)</td>
</tr>
<tr>
<td>Heading text in the index for environments.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/environment content=text</td>
<td>(no default, initially environment content)</td>
</tr>
<tr>
<td>Text used in docEnvironment. P.350.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/index=text</td>
<td>(no default, initially Index)</td>
</tr>
<tr>
<td>Heading text for the index.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/key=text</td>
<td>(no default, initially key)</td>
</tr>
<tr>
<td>Text used in the index for keys.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/keys=text</td>
<td>(no default, initially Keys)</td>
</tr>
<tr>
<td>Heading text used in the index for keys.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/length=text</td>
<td>(no default, initially length)</td>
</tr>
<tr>
<td>Text used in the index for lengths.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/lengths=text</td>
<td>(no default, initially Lengths)</td>
</tr>
<tr>
<td>Heading text in the index for lengths.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/new=text</td>
<td>(no default, initially New)</td>
</tr>
<tr>
<td>Announcement text for new content.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/pageshort=text</td>
<td>(no default, initially P.)</td>
</tr>
<tr>
<td>Short text for page references.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/updated=text</td>
<td>(no default, initially Updated)</td>
</tr>
<tr>
<td>Announcement text for updated content.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/value=text</td>
<td>(no default, initially value)</td>
</tr>
<tr>
<td>Text used in the index for values.</td>
<td></td>
</tr>
<tr>
<td>/tcb/doclang/values=text</td>
<td>(no default, initially Values)</td>
</tr>
<tr>
<td>Heading text in the index for values.</td>
<td></td>
</tr>
</tbody>
</table>


Sets the left hand offset of the documentation texts from docCommand \^P.349, docEnvironment \^P.350, docKey \^P.350, etc, to \{length\}.

\begin{docCommand*} \[doc left=2cm,doc left indent=-2cm\] \{myCommandA\} \{\marg{argument}\} \end{docCommand*}

This is the documentation of \refCom{myCommandA} which takes one \meta{argument}. \myCommandA does some funny things with its \meta{argument}.

\myCommandA{\langle argument \rangle}

This is the documentation of \myCommandA which takes one \langle argument \rangle. \myCommandA does some funny things with its \langle argument \rangle.

Sets the right hand offset of the documentation texts from docCommand \^P.349, docEnvironment \^P.350, docKey \^P.350, etc, to \{length\}.

\begin{docCommand*} \[doc right=2cm\] \{myCommandB\} \{\marg{argument}\} \end{docCommand*}

This is the documentation of \refCom{myCommandB} which takes one \meta{argument}. \myCommandB does some funny things with its \meta{argument}.

\myCommandB{\langle argument \rangle}

This is the documentation of \myCommandB which takes one \langle argument \rangle. \myCommandB does some funny things with its \langle argument \rangle.

Sets the left hand indent of documentation heads from docCommand \^P.349, docEnvironment \^P.350, docKey \^P.350, etc, to \{length\}.

\begin{docCommand*} \[doc left indent=2cm\] \{myCommandC\} \{\marg{argument}\} \end{docCommand*}

This is the documentation of \refCom{myCommandC} which takes one \meta{argument}. \myCommandC does some funny things with its \meta{argument}.

\myCommandC{\langle argument \rangle}

This is the documentation of \myCommandC which takes one \langle argument \rangle. \myCommandC does some funny things with its \langle argument \rangle.

Sets the right hand indent of documentation heads from docCommand \^P.349, docEnvironment \^P.350, docKey \^P.350, etc, to \{length\}.

\begin{docCommand*} \[doc right indent=-10mm,doc right=10mm, doc description=test value\] \{myCommandD\} \{\marg{argument}\} \end{docCommand*}

This is the documentation of \refCom{myCommandD} which takes one \meta{argument}. \myCommandD does some funny things with its \meta{argument}.

\myCommandD{\langle argument \rangle}

(test value)

This is the documentation of \myCommandD which takes one \langle argument \rangle. \myCommandD does some funny things with its \langle argument \rangle.
The head lines of the main documentation environments `docCommand` \( ^\text{P.349} \), `docEnvironment` \( ^\text{P.350} \), `docKey` \( ^\text{P.350} \), etc, are set inside `tcolorbox`es. Options to these `tcolorbox`es can be given using the following keys.

/tcb/doc head command=⟨options⟩ (no default, initially empty)
Sets ⟨options⟩ for the head line of `docCommand` \( ^\text{P.349} \) and `docCommand`* \( ^\text{P.350} \).

```
\tcbset{doc head command={interior style={fill,left color=red!20!white, right color=blue!20!white}}}
\begin{docCommand*}{myCommandE}{\marg{argment}}
This is the documentation of \refCom{myCommandE} which takes one \meta{argument}. \myCommandE does some funny things with its \meta{argument}.
\end{docCommand*}
```

/tcb/doc head environment=⟨options⟩ (no default, initially empty)
Sets ⟨options⟩ for the head line of `docEnvironment` \( ^\text{P.350} \) and `docEnvironment`* \( ^\text{P.350} \).

```
\tcbset{doc head environment={beamer,boxsep=2pt,arc=2pt,colback=green!20!white, after=\par\smallskip}}
\begin{docEnvironment*}{myEnvironment}{\marg{argment}}
This is the documentation of \refEnv{myEnvironment} which takes one \meta{argument}. \myEnvironment does some funny things with its \meta{argument}.
\end{docEnvironment*}
```

/tcb/doc head key=⟨options⟩ (no default, initially empty)
Sets ⟨options⟩ for the head line of `docKey` \( ^\text{P.350} \) and `docKey`* \( ^\text{P.351} \).

```
\tcbset{doc head key={boxsep=4pt,arc=4pt,boxrule=0.6pt, frame style=fill,interior style=fill,colframe=green!50!black}}
\begin{docKey*}{/foo/myKey}{}{no value}
This is the documentation of \refKey{/foo/myKey}.
\end{docKey*}
```

/tcb/doc head=⟨options⟩ (no default, initially empty)
Shortcut for setting the same ⟨options⟩ for /tcb/doc head command, /tcb/doc head environment, and /tcb/doc head key.
Sets a (short!) additional description \textit{(text)} for \texttt{docCommand \`P.349} or \texttt{docEnvironment \`P.350}. Such a description is mandatory for \texttt{docKey \`P.350}.

This is the documentation of \texttt{\refCom\myCommandF} which takes one \texttt{\meta\argument}. \\myCommandF does some funny things with its \texttt{\meta\argument}.

\begin{docCommand*}\[doc description=my description\]{myCommandF}\{\marg\argument}\end{docCommand*}

This is the documentation of \myCommandF which takes one \texttt{\argument}. \myCommandF does some funny things with its \texttt{\argument}.

\begin{docCommand}{\myCommandF}{\argument}\{my description\}
This is the documentation of \myCommandF which takes one \texttt{\argument}. \myCommandF does some funny things with its \texttt{\argument}.

Note that the description \textit{(text)} may overlap with the text on the left hand side if too long. Linebreaks can be used inside the \textit{(text)}.

If set to false, no index entries are written for the main documentation environments. The same effect is achieved by using e.g. \texttt{docCommand* \`P.350} instead of \texttt{docCommand \`P.349}.

\tcbset{doc marginnote={colframe=blue!50!white,colback=blue!5!white}}
This is some text \texttt{\tcbdocmarginnote\{Note A\}} which is commented by a note inside the margin.

\begin{docCommand}{\myCommandF}{\argument}\{text\}
Some command for something.
\end{docCommand}

\begin{docCommand}{\myCommandF}{\argument}\{\textit{date}\}
Some command for something.
\end{docCommand}

\texttt{\tcbdocmarginnote\{Note A\}}
This is some text which is commented by a note inside the margin.

Add a marginnote with a 'New: \texttt{\textit{data}}' message at the beginning of the upper box part.

\begin{docCommand}{\myCommandF}{\argument}\{\textit{date}\}
Some command for something.
\end{docCommand}

\texttt{\tcbdocmarginnote\{Note A\}}
This is some text which is commented by a note inside the margin.

\texttt{\tcbdocmarginnote\{New: \textit{date}\}}
This is some text which is commented by a note inside the margin.

\begin{docCommand}{\myCommandF}{\argument}\{\textit{date}\}
Some command for something.
\end{docCommand}

\texttt{\tcbdocmarginnote\{New: \textit{date}\}}
This is some text which is commented by a note inside the margin.

\begin{docCommand}{\myCommandF}{\argument}\{\textit{date}\}
Some command for something.
\end{docCommand}

\texttt{\tcbdocmarginnote\{Updated: \textit{data}\}}
This is some text which is commented by a note inside the margin.
## A Picture Credits

The following pictures were used inside this documentation.

<table>
<thead>
<tr>
<th>Picture Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>Basilica_5.png</td>
<td><img src="http://commons.wikimedia.org/wiki/File:Basilica_5.png" alt="Basilica_5.png" /></td>
</tr>
<tr>
<td>lichtspiel.jpg</td>
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</tr>
</tbody>
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http://mirror.ctan.org/macros/latex/required/tools/.
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