The storebox Package

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CTAN: http://www.ctan.org/pkg/storebox

VC: https://bitbucket.org/martin_scharrer/storebox

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Abstract

This package allows the placement of identical content multiple times in a document while only storing it once in the output file. At the moment only LaTeX compilers with native PDF output are supported (`pdflatex` or `lualatex`). For other LaTeX compilers a fallback to `\savebox` is implemented.

1 Introduction

LaTeX provides box registers to save content and use it later in the document once or multiple times (or none at all). However, the box content is then written every time to the output file. The PDF file format provides a way to store material as object and reference it later. A similar technique is theoretically possible for PostScript output (but not yet implemented). This has the benefit that the content is really only stored once in the output file. However, if file compression is used for the final output file the size benefit might be very small if the content is only reused a low number of times.

This package provides "store boxes" which have the same user interface like normal LaTeX "save boxes", but only store the content once in the output file even if it is used several times. At the moment only PDF output is supported (i.e. `pdflatex` and `lualatex`). If the stored content is not used in the document after all it is not written to the PDF except if the immediate option was used. For any other TeX and output format the package simply falls back to use the normal savebox equivalents.

2 Known issues

There are some known side effects with advanced graphic elements, namely transparencies and shadings. These elements require special driver code which adds the required PDF instructions. For TikZ/PGF drawings this is done by the `pdftex` driver of TikZ/PGF. However, due to a bug in this driver transparent material is not supported, but shown fully opaque if the storebox also holds PDF shadings. This affects `pgfsys-pdftex.def` in v1.26 from 2009/05/22 and earlier versions. Since `storebox` v1.3 from 2011/12/20 a set of patches for the PGF `pdftex` driver is loaded (as support package `storebox-pgf`), so that both transparencies and shadings are

supported together. The patches are not loaded if a new version of the driver is detected. Please report all issues with this patches to the `storebox` author, not to the TikZ/PGF authors.

3 Options

The package allows to enable and disable the storebox feature. Normally this is selected automatically dependent if PDF output is used (using `ifpdf`). It also provides two options enable and disable to explicitly switch the storebox feature on or off. The disable option is useful to see the resulting file size difference. The usage of the enable option should not be required and will lead to errors if used with unsupported TEX formats.

Two further complementary options delayed (default) and immediate are provided. They control if a storebox (i.e. the underlying `\pdfxform`) is written to the PDF immediately or only after it gets referenced, i.e. is inserted into the document using `\usestorebox`. With immediate the storebox is always written into the PDF, even if it is not used. By default delayed is used, but it is possible that immediate is required if `\storebox` is used inside other `\pdfxform` 's, e.g. inside certain TikZ/PGF nodes. If any graphic issues occur in a document the immediate option should first be tested before sending any bug reports.

4 Macros

`\newstorebox{`⟨*\boxname*⟩`}`

Because storeboxes are stored as PDF objects and not as TEX box registers it is not required to allocate a register for them. However, in fall-back mode the used control sequence ⟨*\boxname*⟩ must be defined as savebox. This macro defines ⟨*\boxname*⟩ simply as `\relax` (just as precaution) and is equal to `\newsavebox` in fall-back mode.

`\storebox{`⟨*\boxname*⟩`}{`⟨*content*⟩`}`

This stores the ⟨*content*⟩ as ⟨*\boxname*⟩ (which is actually just a numeric reference) for later use. The `collectbox` package is used to collect the ⟨*content*⟩ as box and not as macro argument and therefore it can contain verbatim and other special material. The braces can also be written in their explicit form `\bgroup` and `\egroup` and then split in two different macros or across the begin and end of an environment. It is possible to use `\storebox` multiple times with the same ⟨*\boxname*⟩. This will create a new PDF object without affected the old one. In fall-back mode this macro is functional equal to `\savebox` (but then still uses `collectbox`).

```
\begin{storebox}{⟨\boxname⟩}
  ⟨content⟩
\end{storebox}
```

This is the environment version of `\storebox`. Special care is taken to allow for an identical name. In fall-back mode this macro is equal to the `lrbox` environment.

`\usestorebox{`⟨*\boxname*⟩`}`

This macro typesets the stored content at the current position (as horizontal box in horizontal mode). This is realized by adding a PDF reference to the stored content. In fall-back mode this macro is equal to `\usebox`.

`\ifstorebox`

This if-switch is set to *true* if `\storebox` was successfully defined as intended but to *false* if the `\savebox` fall-back was used.

5 Example

```
\documentclass{article}

\usepackage{storebox}

\newstorebox{\mybox} % Not really required for PDF ⁄
   output
\begin{document}

\storebox{\mybox}{\verb+Supports verbatim #$\empty+}

\usestorebox{\mybox}
\usestorebox{\mybox}

\storebox\mybox\bgroup
Can also be split
\verb+\empty+
\egroup

\usestorebox{\mybox}
\usestorebox{\mybox}

\begin{storebox}{\mybox}
    Or used as environment
    (then will ignore leading and trailing spaces)
\end{storebox}

\usestorebox{\mybox}
\usestorebox{\mybox}

\end{document}
```

6 Implementation

```
%<!COPYRIGHT>
\ProvidesPackage{storebox}[%
%<!DATE>
%<!VERSION>
%<*DRIVER>
    2099/01/01 develop
%</DRIVER>
    Store and reuse boxes in a file size efficient ⁄
       way]

\DeclareOption{disable}{\let\ifstorebox\iffalse}
\DeclareOption{enable}{\let\ifstorebox\iftrue}
\DeclareOption{immediate}{\let\storebox@immediate\⁄
   immediate}
\DeclareOption{delayed}{\let\storebox@immediate\relax⁄
   }
\ExecuteOptions{delayed}
\ProcessOptions*
\expandafter\ifx\csname ifstorebox\endcsname\relax
    \RequirePackage{ifpdf}
    \expandafter\let\csname ifstorebox\expandafter\⁄
       endcsname\csname ifpdf\endcsname
\fi

\RequirePackage{collectbox}[2011/08/04]
```

`\storebox`

```
\newcommand*\storebox{%
    \begingroup
        \def\@tempa{storebox}%
    \ifx\@currenvir\@tempa
        \endgroup
        \expandafter\@storebox@env
    \else
        \endgroup
        \expandafter\@storebox
    \fi
}

\ifstorebox
```

`\@storebox`

Macro version:

```
\def\@storebox#1{%
    \begingroup
    \@collectboxto\collectedbox{%
        \storebox@immediate\pdfxform resources {\the\
            pdfpageresources}\collectedbox
        \endgroup\mathchardef#1=\pdflastxform
    }%
}
```

\@storebox@env

Environment version. Code adapted from `lrbox` environment. The group added by `\begin` and `\end` must be specially handled to allow for a local assignment.

```
\def\@storebox@env#1{%
    \edef\@tempa{%
        \setbox\collectedbox\hbox\bgroup%
            \def\noexpand\the@storebox{\noexpand#1}%
    }%
    \@tempa
    \begingroup
    \aftergroup\@storebox@env@end
    \@endpefalse
    \color@setgroup
    \begingroup
    \def\@currenvir{storebox\empty}%
    \ignorespaces
}
```

\endstorebox

```
\def\endstorebox{%
    \unskip
    \endgroup
    \color@endgroup
}
```

\@storebox@env@end

This ends the box assignment and stores the box as PDF xform. Then the given control sequence is set to the xform number.

```
\def\@storebox@env@end{%
    \edef\@tempa{%
        \egroup
        \immediate\pdfxform resources {\the\
            pdfpageresources}\collectedbox
```

```
62          \endgroup
63          \mathchardef\expandafter\noexpand\
               the@storebox=\pdflastxform
64      }%
65      \@tempa
66  }
```

\newstorebox

```
67  \newcommand*\newstorebox[1]{%
68      \@ifdefinable{#1}{\let#1\relax}%
69  }
```

\usestorebox

```
70  \newcommand*\usestorebox[1]{%
71      \mbox{\pdfrefxform#1}%
72  }
```

Load PGF driver patches if required:

```
73  \AtBeginDocument{%
74      \@ifpackageloaded{pgf}{\RequirePackage{storebox-
           pgf}{}}%
75  }

76  \else
```

\@storebox

Macro version:

```
77  \def\@storebox#1{\@collectboxto{#1}{}}
```

\@storebox@env

```
78  \def\@storebox@env{%
79    \edef\@currenvir{\@currenvir\noexpand\noexpand\
         noexpand\empty}%
80    \lrbox
81  }
```

`\endstorebox`

```
\def\endstorebox{%
    \endlrbox
    \edef\@currenvir{\@currenvir}%
}
```

`\newsavebox`

```
\@ifdefinable\newstorebox{%
\let\newstorebox\newsavebox
}
```

`\usestorebox`

```
\@ifdefinable\usestorebox{%
\let\usestorebox\usebox
}

\fi
```

6.1 PGF patches

```
%% This support package contains patches for the file ’pgfsys-pdftex.def’ file from
%% the TikZ/PGF bundle. All patches code is copyright by the TikZ/PGF authors
%% and is used in this file according to the LPPL license.
%% Please see the copyright and license notices in the ’pgfsys-pdftex.def’ file.
%%
%% The rest of the code of this file is under the following copyright and licence:
%%
%<!COPYRIGHT>
\ProvidesPackage{storebox-pgf}[%
%<!DATE>
%<!VERSION>
%<*DRIVER>
    2099/01/01 develop
%</DRIVER>
    Patches for PGF to support transparency and shadings inside storeboxes]
```

```
\begingroup
\let\on@line\@gobble
%

\@ifl@ter{def}{pgfsys-pdftex}{2009/05/23}{%
   \PackageInfo{storebox-pgf}{Newer version of '⁄
      pgfsys-pdftex.def' found.\MessageBreak No ⁄
      patches applied.}%
   \endgroup
   \endinput
}{}%
```

\storebox@patch

```
\def\storebox@patch#1#2#3#4{%
    \ifx#1\@undefined
        \PackageInfo{storebox-pgf}{Macro \string#1\⁄
           space not defined.\MessageBreak No patch ⁄
           applied.}%
    \else
        \def\@tempa#2{#3}%
        \ifx#1\@tempa
            \PackageInfo{storebox-pgf}{Patching macro⁄
                \string#1.}%
            \gdef#1#2{#4}%
        \else
            \PackageInfo{storebox-pgf}{Macro \string⁄
               #1\space with unknown definition.\⁄
               MessageBreak No patch applied.}%
        \fi
    \fi
}

\storebox@patch\pgfsys@horishading{#1#2#3}{%
  {%
    \pgf@parsefunc{#3}%
    \pgfmathparse{#2}%
    \setbox\pgfutil@tempboxa=\hbox to\pgf@max{\vbox ⁄
       to\pgfmathresult pt{\vfil\pgfsys@invoke{/Sh sh⁄
       }}\hfil}%
    \pgf@process{\pgfpoint{\pgf@max}{#2}}%
    \pdfxform resources {%
      /Shading << /Sh << /ShadingType 2
      /ColorSpace /DeviceRGB
      /Domain [\pgf@pdfparseddomain]
      /Coords [\pgf@doma\space0 \pgf@domb\space0]
      /Function \pgf@pdfparsedfunction
      /Extend [false false] >> >>}\pgfutil@tempboxa% ⁄
          <<
```

```
    \expandafter\xdef\csname @pgfshading#1!\endcsname
      {\leavevmode\noexpand\pdfrefxform\the\
      pdflastxform}%
  }%
}{%
  {%
    \pgf@parsefunc{#3}%
    \pgfmathparse{#2}%
    \setbox\pgfutil@tempboxa=\hbox to\pgf@max{\vbox
      to\pgfmathresult pt{\vfil\pgfsys@invoke{/Sh sh
      }}\hfil}%
    \pgf@process{\pgfpoint{\pgf@max}{#2}}%
    \immediate\pdfxform resources {%
      /Shading << /Sh << /ShadingType 2
      /ColorSpace /DeviceRGB
      /Domain [\pgf@pdfparseddomain]
      /Coords [\pgf@doma\space0 \pgf@domb\space0]
      /Function \pgf@pdfparsedfunction
      /Extend [false false] >> >>}\pgfutil@tempboxa%
        <<
    \expandafter\xdef\csname @pgfshading#1!\endcsname
      {\leavevmode\noexpand\pdfrefxform\the\
      pdflastxform}%
  }%
}

\storebox@patch\pgfsys@vertshading{#1#2#3}{%
  {%
    \pgf@parsefunc{#3}%
    \pgfmathparse{#2}%
    \setbox\pgfutil@tempboxa=\hbox to\pgfmathresult
      pt{\vbox to\pgf@max{\vfil\pgfsys@invoke{/Sh sh
      }}\hfil}%
    \pgf@process{\pgfpoint{#2}{\pgf@max}}%
    \pdfxform resources {%
      /Shading << /Sh << /ShadingType 2
      /ColorSpace /DeviceRGB
      /Domain [\pgf@pdfparseddomain]
      /Coords [0 \pgf@doma\space0 \pgf@domb]
      /Function \pgf@pdfparsedfunction
      /Extend [false false] >> >>}\pgfutil@tempboxa%
        <<
    \expandafter\xdef\csname @pgfshading#1!\endcsname
      {\leavevmode\noexpand\pdfrefxform\the\
      pdflastxform}%
  }%
}{%
  {%
    \pgf@parsefunc{#3}%
    \pgfmathparse{#2}%
```

```
    \setbox\pgfutil@tempboxa=\hbox to\pgfmathresult pt{\vbox to\pgf@max{\vfil\pgfsys@invoke{/Sh sh}}\hfil}%
    \pgf@process{\pgfpoint{#2}{\pgf@max}}%
    \immediate\pdfxform resources {%
      /Shading << /Sh << /ShadingType 2
      /ColorSpace /DeviceRGB
      /Domain [\pgf@pdfparseddomain]
      /Coords [0 \pgf@doma\space0 \pgf@domb]
      /Function \pgf@pdfparsedfunction
      /Extend [false false] >> >>}\pgfutil@tempboxa% <<
    \expandafter\xdef\csname @pgfshading#1!\endcsname{\leavevmode\noexpand\pdfrefxform\the\pdflastxform}%
  }%
}

\storebox@patch\pgfsys@radialshading{#1#2#3}{%
  {%
    \pgf@parsefunc{#3}%
    \setbox\pgfutil@tempboxa=\hbox to2\pgf@max{\vbox to2\pgf@max{\vfil\pgfsys@invoke{/Sh sh}}\hfil}%
    \pgf@process{#2}%
    \pgf@xa=\pgf@x%
    \pgf@ya=\pgf@y%
    \pgf@process{\pgfpoint{\pgf@max}{\pgf@max}}%
    \advance\pgf@xa by \pgf@x%
    \advance\pgf@ya by \pgf@y%
    \pgf@sys@bp@correct{\pgf@x}%
    \pgf@sys@bp@correct{\pgf@y}%
    \pgf@sys@bp@correct{\pgf@xa}%
    \pgf@sys@bp@correct{\pgf@ya}%
    \pdfxform resources {%
      /Shading << /Sh << /ShadingType 3
      /ColorSpace /DeviceRGB
      /Domain [\pgf@pdfparseddomain]
      /Coords [\pgf@sys@tonumber{\pgf@xa} \pgf@sys@tonumber{\pgf@ya} \pgf@doma\space \pgf@sys@tonumber{\pgf@x} \pgf@sys@tonumber{\pgf@y} \pgf@domb]
      /Function \pgf@pdfparsedfunction
      /Extend [true false] >> >>}\pgfutil@tempboxa% <<
    \expandafter\xdef\csname @pgfshading#1!\endcsname{\leavevmode\noexpand\pdfrefxform\the\pdflastxform}%
  }%
}{%
```

```
    {%
      \pgf@parsefunc{#3}%
      \setbox\pgfutil@tempboxa=\hbox to2\pgf@max{\vbox to2\pgf@max{\vfil\pgfsys@invoke{/Sh sh}}\hfil}%
      \pgf@process{#2}%
      \pgf@xa=\pgf@x%
      \pgf@ya=\pgf@y%
      \pgf@process{\pgfpoint{\pgf@max}{\pgf@max}}%
      \advance\pgf@xa by \pgf@x%
      \advance\pgf@ya by \pgf@y%
      \pgf@sys@bp@correct{\pgf@x}%
      \pgf@sys@bp@correct{\pgf@y}%
      \pgf@sys@bp@correct{\pgf@xa}%
      \pgf@sys@bp@correct{\pgf@ya}%
      \immediate\pdfxform resources {%
        /Shading << /Sh << /ShadingType 3
        /ColorSpace /DeviceRGB
        /Domain [\pgf@pdfparseddomain]
        /Coords [\pgf@sys@tonumber{\pgf@xa} \pgf@sys@tonumber{\pgf@ya} \pgf@doma\space \pgf@sys@tonumber{\pgf@x} \pgf@sys@tonumber{\pgf@y} \pgf@domb]
        /Function \pgf@pdfparsedfunction
        /Extend [true false] >> >>}\pgfutil@tempboxa% <<
      \expandafter\xdef\csname @pgfshading#1!\endcsname{\leavevmode\noexpand\pdfrefxform\the\pdflastxform}%
    }%
}%

\storebox@patch\pgfsys@functionalshading{#1#2#3#4}{%
    {%
      \pgf@process{#2}%
      \pgf@xa=\pgf@x%
      \pgf@ya=\pgf@y%
      \pgf@process{#3}%
      \pgf@xb=\pgf@x%
      \pgf@yb=\pgf@y%
      \advance\pgf@x by-\pgf@xa%
      \advance\pgf@y by-\pgf@ya%
      \setbox\pgfutil@tempboxa=\hbox to\pgf@x{\vbox to\pgf@y{\vfil\pgfsys@invoke{/Sh sh}}\hfil}%
      \pgf@sys@bp@correct{\pgf@xa}%
      \pgf@sys@bp@correct{\pgf@ya}%
      \pgf@sys@bp@correct{\pgf@xb}%
      \pgf@sys@bp@correct{\pgf@yb}%
      \pgf@xc=-\pgf@xa%
      \pgf@yc=-\pgf@ya%
```

```
      % Now build the function
      \pdfobj
      stream
      attr
      {
        /FunctionType 4
        /Domain [\pgf@sys@tonumber{\pgf@xa}\space\
           pgf@sys@tonumber{\pgf@xb}\space\
           pgf@sys@tonumber{\pgf@ya}\space\
           pgf@sys@tonumber{\pgf@yb}]
        /Range [0 1 0 1 0 1]
      }
      {{#4}}%
      \edef\pgf@temp@num{\the\pdflastobj}%
      \pdfxform resources {%
        /Shading << /Sh << /ShadingType 1
        /ColorSpace /DeviceRGB
        /Matrix [1 0 0 1 \pgf@sys@tonumber{\pgf@xc}\
           space\pgf@sys@tonumber{\pgf@yc}]
        /Domain [\pgf@sys@tonumber{\pgf@xa}\space\
           pgf@sys@tonumber{\pgf@xb}\space\
           pgf@sys@tonumber{\pgf@ya}\space\
           pgf@sys@tonumber{\pgf@yb}]
        /Function \pgf@temp@num\space 0 R
        >> >>}\pgfutil@tempboxa% <<
      \expandafter\xdef\csname @pgfshading#1!\endcsname\
         {%
        \leavevmode%
        \noexpand\pdfrefxform\the\pdflastxform%
        \noexpand\pdfrefobj\pgf@temp@num%
      }%
    }%
  }{%
    {%
      \pgf@process{#2}%
      \pgf@xa=\pgf@x%
      \pgf@ya=\pgf@y%
      \pgf@process{#3}%
      \pgf@xb=\pgf@x%
      \pgf@yb=\pgf@y%
      \advance\pgf@x by-\pgf@xa%
      \advance\pgf@y by-\pgf@ya%
      \setbox\pgfutil@tempboxa=\hbox to\pgf@x{\vbox to\
         pgf@y{\vfil\pgfsys@invoke{/Sh sh}}\hfil}%
      \pgf@sys@bp@correct{\pgf@xa}%
      \pgf@sys@bp@correct{\pgf@ya}%
      \pgf@sys@bp@correct{\pgf@xb}%
      \pgf@sys@bp@correct{\pgf@yb}%
      \pgf@xc=-\pgf@xa%
      \pgf@yc=-\pgf@ya%
```

```
296       % Now build the function
297       \pdfobj
298       stream
299       attr
300       {
301         /FunctionType 4
302         /Domain [\pgf@sys@tonumber{\pgf@xa}\space\⁄
                pgf@sys@tonumber{\pgf@xb}\space\⁄
                pgf@sys@tonumber{\pgf@ya}\space\⁄
                pgf@sys@tonumber{\pgf@yb}]
303         /Range [0 1 0 1 0 1]
304       }
305       {{#4}}%
306       \edef\pgf@temp@num{\the\pdflastobj}%
307       \immediate\pdfxform resources {%
308         /Shading << /Sh << /ShadingType 1
309         /ColorSpace /DeviceRGB
310         /Matrix [1 0 0 1 \pgf@sys@tonumber{\pgf@xc}\⁄
                space\pgf@sys@tonumber{\pgf@yc}]
311         /Domain [\pgf@sys@tonumber{\pgf@xa}\space\⁄
                pgf@sys@tonumber{\pgf@xb}\space\⁄
                pgf@sys@tonumber{\pgf@ya}\space\⁄
                pgf@sys@tonumber{\pgf@yb}]
312         /Function \pgf@temp@num\space 0 R
313         >> >>}\pgfutil@tempboxa% <<
314       \expandafter\xdef\csname @pgfshading#1!\endcsname⁄
            {%
315         \leavevmode%
316         \noexpand\pdfrefxform\the\pdflastxform%
317         \noexpand\pdfrefobj\pgf@temp@num%
318       }%
319     }%
320   }

321   \storebox@patch\pgfsys@fadingfrombox{#1#2}{%
322     {%
323       \pgf@sys@pdf@check@resources%
324       \pgf@x=-.5\wd#2%
325       \pgf@y=-.5\ht#2%
326       \advance\pgf@y by.5\dp#2%
327       \expandafter\xdef\csname pgfsmasktrans@#1\⁄
            endcsname{%
328         \noexpand\pgftransformcm{1}{0}{0}{1}{\noexpand\⁄
              pgfqpoint{\the\pgf@x}{\the\pgf@y}}}%
329       \pdfxform resources { \⁄
            pgf@sys@pdf@possible@resources } #2%
330       \expandafter\xdef\csname pgfsmaskxform@#1\⁄
            endcsname{\the\pdflastxform}%
331     }%
332   }{%
```

```
    {%
      \pgf@sys@pdf@check@resources%
      \pgf@x=-.5\wd#2%
      \pgf@y=-.5\ht#2%
      \advance\pgf@y by.5\dp#2%
      \expandafter\xdef\csname pgfsmasktrans@#1\endcsname{%
        \noexpand\pgftransformcm{1}{0}{0}{1}{\noexpand\pgfqpoint{\the\pgf@x}{\the\pgf@y}}%
      \immediate\pdfxform resources { \pgf@sys@pdf@possible@resources } #2%
      \expandafter\xdef\csname pgfsmaskxform@#1\endcsname{\the\pdflastxform}%
    }%
  }
  \storebox@patch\pgfsys@transparencygroupfrombox{#1}{%
    \pgf@sys@pdf@check@resources%
    \pdfxform
    attr { /Group << /S /Transparency >> } %<<
    resources { \pgf@sys@pdf@possible@resources }
    #1%
    \setbox#1=\hbox{\pdfrefxform\pdflastxform}%
  }{%
    \pgf@sys@pdf@check@resources%
    \immediate\pdfxform
    attr { /Group << /S /Transparency >> } %<<
    resources { \pgf@sys@pdf@possible@resources }
    #1%
    \setbox#1=\hbox{\pdfrefxform\pdflastxform}%
  }
  \endgroup
```