Writing, running and including the output of external documents from within a main LaTeX document –v. 0.36

Herbert Voß hvoss@tug.org*

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Contents

*Thanks to Karl Berry; Werner Lemberg; Rolf Niepraschk

1 Loading the package

`\usepackage[Option]{hvextern}`

There exists only one option `checkCode` which is valid for all TEX-compiler. In this case an already existing external file will only be compiled, if the external code changed. This dosn't depends on the setting of the option `force`. `checkCode` can speed up the compilation time.

2 Syntax

This package allows to write external METAPOST, TEX, ConTEXt, LATEX, LuaTEX, LuaLATEX, XETEX, XELATEX, Lua, Perl, Java and/or Python source code, which will then be run via `shell escape` to create a PDF oder text output to include it into the main LATEX document.

There is only one environment and one command:

```
\begin{externalDocument}[‹options›]{‹external filename without extension›}
...
source code
...
\end{externalDocument}

\runExtCmd[‹options›]
    {‹command with arguments›}
    {‹external filename without extension›}
```

The very first compilation run of the main document must be done with the `–shell–escape` command-line option, otherwise it won't work. Follow-up runs, for example, to resolve references, should usually be done without `–shell–escape`.

The currently used filename for the example is saved in the macro `\hvExternFilename`.

```
lualatex --shell-escape ‹file›
```

The purpose for this package is to show the output of documents which have to be compiled with a different preamble or a different engine or a complete different system, but integrating the output automatically in the main document..

All examples in this document are created on-the-fly while running this LATEX document with `lualatex` with the `--shell-escape` option.

3 First examples

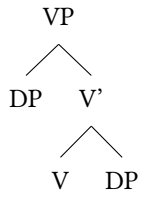
3.1 Without showing the code

This document was run with LuaLATEX. Suppose you want to insert the output of a document which needs for several reasons a XELATEX run. Instead of created and running a document outside of the main document and then to insert the output we can do this from within this LuaLATEX document itself. The external document is compiled with XELATEX and the output is insert as pdf image: 美好的一天.

The current filename of the above example is voss-1.

Let's show another example which needs a pdfLaTeX run. The source code itself is also not shown by the environment externalDocument.

```
\begin{externalDocument}[
  compiler=pdflatex,force=true,cleanup]{voss}
\documentclass{standalone}
%StartVisiblePreamble
\usepackage{fontenc}
\usepackage{libertinus}
\usepackage[linguistics]{forest}
\forestapplylibrarydefaults{linguistics,
    edges}
%StopVisiblePreamble
\begin{document}
\begin{forest}
[VP
  [DP]
  ['V
   [V]
  [DP]
  ]
]
\end{forest}
\end{document}
\end{externalDocument}
```



3.2 Showing code and output of a Python example

The png image is created on the fly with the following arguments of externalDocument:

```
\begin{externalDocument}[
  compiler=python3,
  code,
  ext=py,
  docType=py,
  usefancyvrb,
  grfOptions={width=\linewidth}]{python}
... Python code ...
\end{externalDocument}
```

The code which is declared as header and main can be marked by:

```
\hv@extern@exampleType{py}
  {\NumChar StartVisibleMain}
  {\NumChar StopVisibleMain}
  {\NumChar StartVisiblePreamble}
  {\NumChar StopVisiblePreamble}
```

\NumChar is the default Python comment character # and needs to be saved with a different catagory, which is done internally by the package. The complete definition of the code is:

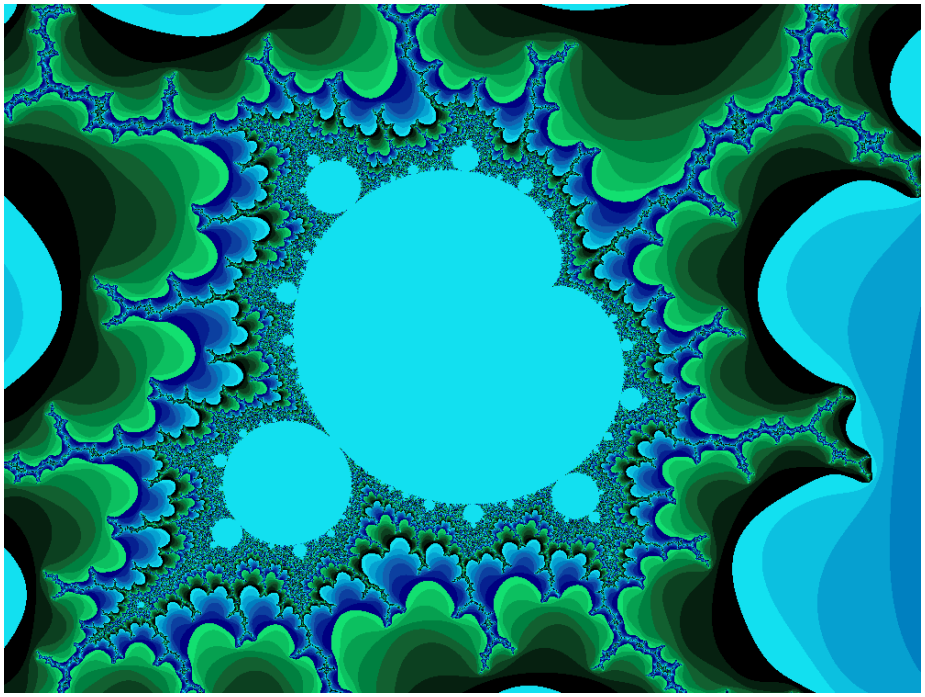
```
\begin{externalDocument}[
  compiler=python3,
  code,
  ext=py,
  force=true,
  docType=py,
  usefancyvrb,
  grfOptions={width=\linewidth}]{python}
import os
#StartVisiblePreamble
from PIL import Image
import subprocess
# drawing area (xa < xb and ya < yb)
xa = -0.1716
xb = -0.1433
ya = 1.022
yb = 1.044
maxIt = 1024  # iterations
imgx = 1000   # image size
imgy = 750
image = Image.new("RGB", (imgx, imgy))
#StopVisiblePreamble

#StartVisibleMain
for y in range(imgy):
    cy = y * (yb - ya) / (imgy - 1)  + ya
    for x in range(imgx):
        cx = x * (xb - xa) / (imgx - 1) + xa
        c = complex(cx, cy)
        z = 0
        for i in range(maxIt):
            if abs(z) > 2.0: break
            z = z * z + c
        r = i % 4 * 6
        g = i % 8 * 32
        b = i % 16 * 16
        image.putpixel((x, y), b * 65536 + g * 256 + r)
#StopVisibleMain
# now get the filename created by the latex document
imageName = os.path.basename(os.path.splitext(__file__)[0])+".png" # get filename
image.save(imageName, "PNG")
\end{externalDocument}
```

And with using this code we get the image as png inserted. The given filename of the external document is internally extended by a consecutive number which isn't known to the Python code. However, it is no problem in any programming language to get the name of a running file. The forlast line in the above code shows how it can be done with Python.

python-3.py

```
from PIL import Image
import subprocess
# drawing area (xa < xb and ya < yb)
xa = -0.1716
xb = -0.1433
ya = 1.022
yb = 1.044
maxIt = 1024  # iterations
imgx = 1000   # image size
imgy = 750
image = Image.new("RGB", (imgx, imgy))
```

```
for y in range(imgy):
    cy = y * (yb - ya) / (imgy - 1)  + ya
    for x in range(imgx):
        cx = x * (xb - xa) / (imgx - 1) + xa
        c = complex(cx, cy)
        z = 0
        for i in range(maxIt):
            if abs(z) > 2.0: break
            z = z * z + c
        r = i % 4 * 6
        g = i % 8 * 32
        b = i % 16 * 16
        image.putpixel((x, y), b * 65536 + g * 256 + r)
```



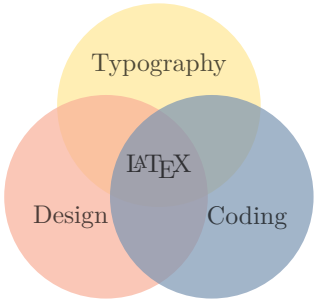
The external filename, extended by a consequtive number, kan be printed in the margin by setting the keyword `showFilename`. In general it is printed in the outer

margin or in twocolumn mode in the outer column. If the example is set in twocolumn mode but inside a starred floating environment over both column, then use the keyword `outerFN`. Then `hvextern` doesn't test for twocolumn mode.

A vertical shift of the filename is possible by setting a length to the keyword `shiftFN`, e.g. `shiftFN=5ex`.

```
\usepackage{tikz}
\usepackage[hks,pantone,xcolor]{xespotcolor}
```

```
\SetPageColorSpace{HKS}
\definecolor{HYellow}{spotcolor}{HKS05N,0.5}
\definecolor{HRed}{spotcolor}{HKS14N,0.5}
\definecolor{HBlue}{spotcolor}{HKS38N,0.5}
\begin{tikzpicture}[scale=0.7,fill opacity
    =0.7]
 \fill[HYellow]( 90:1.2) circle (2);
 \fill[HRed]   (210:1.2) circle (2);
 \fill[HBlue]  (330:1.2) circle (2);
 \node at ( 90:2)  {Typography};
 \node at ( 210:2) {Design};
 \node at ( 330:2) {Coding};
 \node {\LaTeX};
\end{tikzpicture}
```



4 Setting marker in the source

The marker for the code ranges which should be listed depend to the used programming language:

```
[...]
%StartVisiblePreamble
[... listed preamble code ]
%StopVisiblePreamble
[...]
\begin{document}
[...]
\end{document}
```

everything between `%StartVisiblePreamble` and `%StopVisiblePreamble` will be listed as preamble and in case of a LaTeX source everything between `\begin{document}` and `\end{document}` as body. The marker must be defined with an own macro, e.g.:

```
\hv@extern@exampleType{py}
  {\NumChar StartVisibleMain}
  {\NumChar StopVisibleMain}
  {\NumChar StartVisiblePreamble}
  {\NumChar StopVisiblePreamble}
```

`\NumChar` is the comment character `#`, which needs a special handling. This version of `hvextern` supports the following programming languages (option `compiler`): `mpost`, `tex`, `latex`, `luatex`, `python3`, `perl`, `lua`, `xetex`, `pdflatex`, `lualatex`, `xelatex`, and `context`. The default is `pdflatex`. The option `docType` selects the config file, which must be one of `context`, `lua`, `pl`, `tex`, `latex`, `mp`, and `py`. For Lua it is

```
\hv@extern@exampleType{lua}
  {--StartVisibleMain}
```

```
  {--StopVisibleMain}
  {--StartVisiblePreamble}
  {--StopVisiblePreamble}
```

It defines the marker strings for the listed code sequences. In some cases you have to use multiple times the same value for different optional arguments, e.g.

```
ext=lua, compiler=lua, docType=lua, ...
```

5 Optional arguments

The default setting is always shown in brackets.

5.1 Programs and runs

The progpath should only in some rare cases needed. In general all used compilers will be found by the system. A given progpath must be end with a slash, e.g. `./bin/`

```
\define@key{hv}{progpath}[]{\def\hv@extern@progpath{#1}}
\define@key{hv}{compiler}[pdflatex]{\def\hv@extern@compiler{#1}}
\define@key{hv}{runsequence}[]{\def\hv@extern@runsequence{#1}}
\define@key{hv}{runs}[1]{\setcounter{hv@extern@runs}{#1}}
```

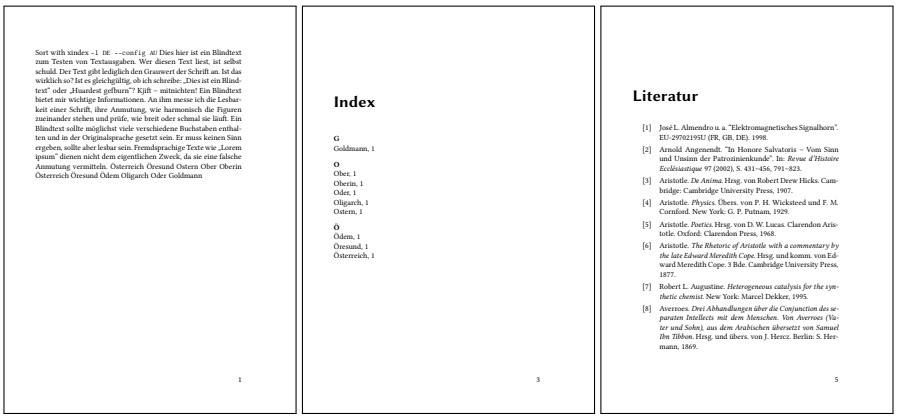
Instead of the optional arguments compiler, biber, and xindex one can define an individual command sequence by using the optional argument runsequence. It must be comma separated list:

```
runsequence={lualatex,biber,xindex -l de -c AU,lualatex,lualatex}
```

voss-5.tex

```
\usepackage[ngerman]{babel}
\usepackage{libertinus,hvindex}
\usepackage{makeidx}\makeindex
\usepackage{biblatex}\addbibresource{biblatex-examples.bib}
```

```
Sort with xindex \verb|-l DE --config AU|
\blindtext
\Index{Österreich} \Index{Öresund}
\Index{Ostern} \Index{Ober} \Index{Oberin}
\Index{Österreich} \Index{Öresund}
\Index{Ödem} \Index{Oligarch} \Index{Oder}
\Index{Goldmann}
\printindex
\nocite{*}\printbibliography
\blindtext
\blinddocument
```



The following Java-program creates the Mandelbrot set as png image. The valid setting for the environment `externalDocument` is:

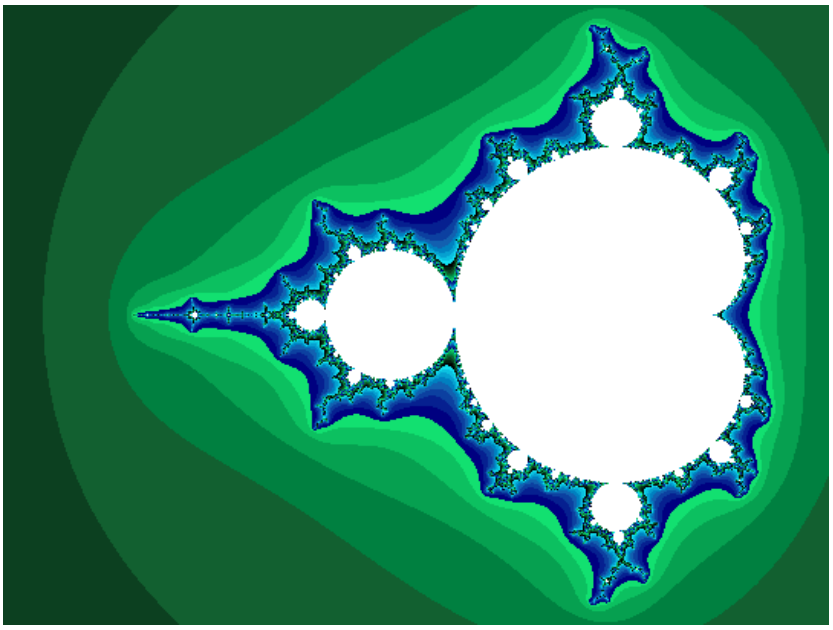
```
compiler=java,ext=java,docType=java,
```

java–6.java

```
public static int iterZahl(final double cx, final double cy, int maxIt,
              final double radius) {
// bestimmt Anzahl der Iterationen
  int zaehler = 0;
  double zx = 0.0, zy = 0.0, tmp;
  do {
    tmp = zx*zx - zy*zy + cx;
    zy = 2*zx*zy + cy; zx = tmp;
    zaehler++;
  } while (zx*zx + zy*zy <= radius && zaehler < maxIt);
  return zaehler;
}
```

```
  double xa = -2.5, xe = 0.7, ya = -1.2, ye = 1.2; // Ratio 20:15
  double dx = (xe-xa)/(imageBreite-1), dy = (ye-ya)/(imageHoehe-1);
  double cx, cy; int R, G, B;
  double radius = 10.0;  int maxIt = 1024;
  cx = xa;
  for (int sp = 0; sp < imageBreite; sp++) {
    cy = ye; // von oben nach unten
    for (int ze = 0; ze < imageHoehe; ze++) {
      int zIter = iterZahl(cx, cy, maxIt, radius);
      if (zIter == maxIt) {
        g.setColor(Color.WHITE);
        g.drawLine(sp, ze, sp, ze);
      } else {
        R = zIter % 4 * 6 ; G = zIter % 8 * 32; B = zIter % 16 * 16;
        g.setColor(new Color(R,G,B));
        g.drawLine(sp, ze, sp, ze);
      }
      cy = cy - dy;
    } // for ze
```

```
      cx = cx + dx;
    } // for sp
```



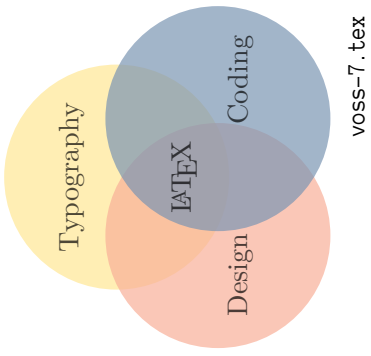
5.2 Grafik options

`\define@key{hv}{grfOptions}[]{\def\hv@extern@grfOptions{#1}}`

The option is passed to `\includegraphics`, e.g. `angle=90,width=\linewidth` for the follwing example.

```
\usepackage{tikz}
\usepackage[hks,pantone,xcolor]{xespotcolor}
```

```
\SetPageColorSpace{HKS}
\definecolor{HYellow}{spotcolor}{HKS05N,0.5}
\definecolor{HRed}{spotcolor}{HKS14N,0.5}
\definecolor{HBlue}{spotcolor}{HKS38N,0.5}
\begin{tikzpicture}[scale=0.7,fill opacity
    =0.7]
 \fill[HYellow]   ( 90:1.2) circle (2);
 \fill[HRed] (210:1.2) circle (2);
 \fill[HBlue]  (330:1.2) circle (2);
 \node at ( 90:2) {Typography};
 \node at ( 210:2) {Design};
 \node at ( 330:2) {Coding};
 \node {\LaTeX};
\end{tikzpicture}
```



voss-7.tex

5.3 Listings options

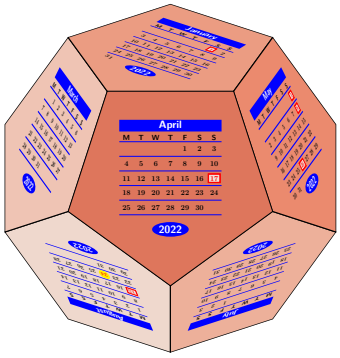
```
\define@key{hv}{lstOptions}[]{\def\hv@extern@lstOptions{#1}}
```

The option is passed either to `\lstinputlisting`, or, if `usefancyvrb` is active, to `\VerbatimInput`. The following example uses

```
lstOptions={basicstyle=\sffamily\itshape\scriptsize},
```

voss-8.tex

```
\usepackage{pst-calendar}
\psscalebox{0.3}{%
  \psCalDodecaeder[Year=2022,style=april]%
}
```



5.4 Background color

There are different colors for the preamble and body listing: the backgrund and frame color.

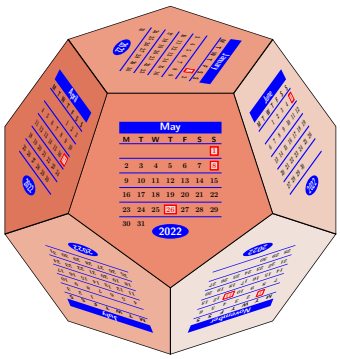
```
\define@key{hv}{BGpreamble}[black12]{\def\hv@extern@BGpreamble{#1}}
\define@key{hv}{BGbody}[black8]{\def\hv@extern@BGbody{#1}}
\define@key{hv}{BOpreamble}[black12]{\def\hv@extern@BOpreamble{#1}}
\define@key{hv}{BObody}[black8]{\def\hv@extern@BObody{#1}}
```

The options are passed to `tcolorbox` and preset to `black"!12` and `black"!8`. The color of the frame is set to the same values, hence not seen. The following example uses

```
BGpreamble=red!10, BOpreamble=red,
BGbody=blue!8, BObody=blue,
```

voss-9.tex

```
\usepackage{pst-calendar}
\psscalebox{0.3}{%
  \psCalDodecaeder[Year=2022,style=may]%
}
```



5.5 Type of the source code

The current version of hvextern supports code written as METAPOST, plain TEX, LATEX, ConTEXt, and Python. Every type has its own keywords for the linerange which should be printed for the preamble and the body. For example the latex config is:

```
\hv@extern@exampleType{latex}%                    for _all_LaTeX engines
  {\string\begin\string{document\string}}%
  {\string\end\string{document\string}}%
  {\perCent StartVisiblePreamble}%
  {\perCent StopVisiblePreamble}%

% only for the sequence latex->dvips->ps2pdf
\def\hv@extern@runLATEX#1#2#3#4{% path compiler file extension
  \ifhv@extern@verbose \typeout{>>>> running #1#2 #3#4}\fi
  \ShellEscape{#1#2\space #3#4}%
  \ifhv@extern@verbose \typeout{>>>> running #1dvips #3}\fi
  \ShellEscape{#1dvips\space #3.dvi}%
  \ifhv@extern@verbose \typeout{>>>> running ps2pdf #3.ps}\fi
  \ShellEscape{#1ps2pdf\space -dAutoRotatePages=/None\space -dALLOWPSTRANSPARENCY\space  #3.ps}%
}
```

If a source needs more than running the defined compiler, it must be defined by a macro

```
\def\hv@extern@run<NAME>#1#2#3#4{% path compiler file extension
...}
```

The type of the source code can be different to the compiler, e.g. source latex, but compiler lualatex.

5.6 Output more than one page

The pages which should be printed can be defined by

```
\define@key{hv}{pages}[1]{\def\hv@extern@pages{#1}}
\define@key{hv}{pagesep}[1em]{\hv@extern@pagesep=#1}
\define@boolkey{hv}[hv@extern@]{frame}[true]{}
```

With frame the pages can be framed (internally by \fbox). It is leaved to the user to choose the correct image width for the pages. The separation between the pages is defined by the length pagesep. The following example uses:

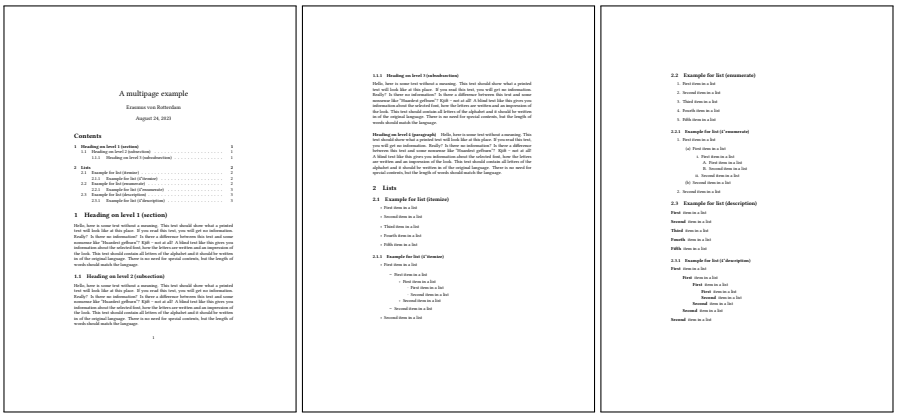
```
  pages={1,2,3},
  pagesep=2pt,
  grfOptions={width=0.3\linewidth},
  compiler=lualatex, runs=2,  % for the TOC
  frame,
```

```
\usepackage[american]{babel}
\usepackage{libertinus}
```

voss-10.tex

```
\usepackage{blindtext}
```

```
\title{A multipage example}
\author{Erasmus von Rotterdam}
\maketitle
\tableofcontents
\blinddocument
```



5.7 Output as floating object with caption and label

By default the images are not inserted as a float. This can be changed by the keyword `float`, a caption and a label are optional. The float type is always `figure`.

```
\define@boolkey{hv}[hv@extern@]{float}[true]{}
\define@key{hv}{floatsetting}[]{\def\hv@extern@floatsetting{#1}}
\define@key{hv}{caption}[]{\def\hv@extern@caption{#1}}
\define@key{hv}{label}[]{\def\hv@extern@label{#1}}
```

The image Figure 1 shows an example for a floating object, which uses the floatsetting `!htb`, which is the default. Using a caption and a label are optional.

voss-11.tex

```
\usepackage{pst-coxeterp}
```

```
\begin{pspicture}(-1,-1)(1,1)\Simplex[dimension=2]\end{pspicture}
\begin{pspicture}(-1,-1)(1,1)\Simplex[dimension=3]\end{pspicture}
\begin{pspicture}(-1,-1)(1,1)\Simplex[dimension=5]\end{pspicture}
\begin{pspicture}(-1,-1)(1,1)\Simplex[dimension=7]\end{pspicture}
```

5.8 Cropping the PDF

Instead of using the documentclass `standalone`, which already crops the created PDF, one can use the optional argument `crop`.

```
\define@boolkey{hv}[hv@extern@]{crop}[true]{}
\define@key{hv}{cropmargin}[2]{\def\hv@extern@cropmargin{#1 }}% length in pt
```

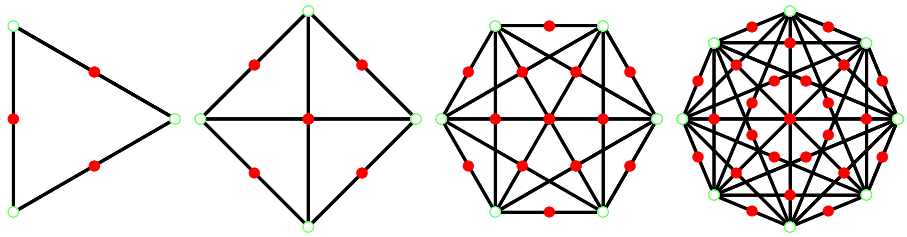


Figure 1: An example for Coxeter images

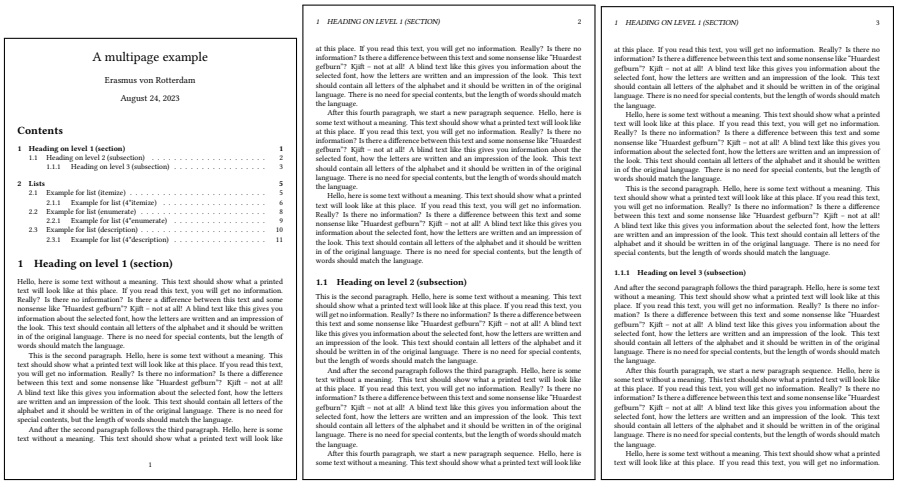
It is also possible to crop a document with more than one page. In this case the beginning and end of the pages should be on the same height. Otherwise the pages will have different heights after cropping (see next image). The follwoing example was created with

```
pages={1,2,3},
pagesep=2pt,
grfOptions={width=0.3\linewidth},
compiler=lualatex, runs=2,  % for the TOC
frame,
crop, cropmargin=5,%    5pt margin
```

voss-12.tex

```
\usepackage[american]{babel}
\usepackage{libertinus}
\usepackage{blindtext}
\pagestyle{headings}
```

```
\title{A multipage example}
\author{Erasmus von Rotterdam}
\maketitle
\tableofcontents
\Blinddocument
```



5.9 Code and output side by side

By default the code and the output is on top of each other. With setting the width of a minipage with `mpwidth` greater than 0 pt the output will be side by side.

```
\define@key{hv}{mpwidth}[0pt]{\setlength\hv@extern@mpwidth{#1}}
\define@key{hv}{mpvalign}[0pt]{\def\hv@extern@mpvalign{#1}}
```

`mpwidth` is the width of the code. The rest of the line, minus 1em for the space between the minipages, will be the possible width for the output and will be calculated automatically. The two minipages are aligned by defaults to its top. This can be changed by setting `mpvalign` to `c` or `b`.

5.10 Horizontal alignment of the output

```
  align=\centering,  % default
```

```
\rule{0.5\linewidth}{5mm}
```

```
  align=\raggedright,
```

```
\rule{0.5\linewidth}{5mm}
```

```
  align=\raggedleft,
```

```
\rule{0.5\linewidth}{5mm}
```

```
  align=\centering,  mpwidth=0.5\linewidth,   % default for side by side
```

```
\rule{0.25\linewidth}{5mm}
```

```
  align=\raggedright,   mpwidth=0.5\linewidth,
```

```
\rule{0.25\linewidth}{5mm}
```

```
  align=\raggedleft,  mpwidth=0.5\linewidth,
```

```
\rule{0.25\linewidth}{5mm}
```

5.11 Inline images

By default code and image are own paragraphs. With the optional argument `inline` the created image can be part of the current line. This may make sense, if you need characters which are not part of your current font.

```
\define@boolkey{hv}[hv@extern@]{inline}[true]{%
    \hv@extern@codefalse
    \hv@extern@showFilenamefalse}
```

With the setting `inline=true` the optional keyword `code` and `showFilename` is automatically set to false. The next Chinese characters %美好的一天are inserted as inline image without showing the code. The complete code looks like:

```
With \Lkeyset{inline} the optional argument \Lkeyword{code} is
automatically set to false. The next  Chinese characters
\begin{externalDocument}[
  compiler=xelatex, inline, runs=2, grfOptions={height=8pt},
  crop, cropmargin=0, cleanup, force=true, docType=latex]{voss}
\documentclass{ctexart}
\pagestyle{empty}
\begin{document}
□□□□□
\end{document}
\end{externalDocument}
are inserted as inline image without showing the code. The complete
code looks like:
```

5.12 Input text instead of an image

By default the created pdf which can be, of course, only text, will be inserted by `\includegraphics`. If you have only text as output and don't want to create a pdf you can insert this kind of output as verbatim text by setting `includegraphic=false` .

```
\define@boolkey{hv}[hv@extern@]{includegraphic}[true]{}
```

The textfile must have the same main filename with the extension `.txt`. As already mentioned, in every programming language you can get the current used filename from within the code itself. The following Perl example which calculates the Kaprekar constants uses

```
my $filename = $0;             # the current filename
$filename =~ s/\.pl//;         # without extension .pl
$filename = "${filename}.txt"; # for the output
```

Only for some completeness: a Kaprekar constant is a number A with $\max(A) - \min(A) = A$. max and min are the sorted digits of the number A: $495 = 954 - 459$.

voss-20.pl

```
my $zahl = 1;
my $anfang = 1;
my $ende = 9;

print $fh "Finding Kaprekarconstants ...\n";
while ($zahl < 8) {
  print $fh "${zahl}-stellig: ";
  foreach ($anfang...$ende) { # for every

      row $_
    @Zeichen = split(//,$_);
    $Min = join("",sort(@Zeichen));
    $Max = reverse($Min);

    $Dif=$Max-$Min;
    if($_ eq $Dif) {
      $found = 1;
      print $fh $_,",  ";

    }
  }
  if (!$found) { print $fh "---\n"; }
  else         { print $fh "\n";    }

  $found = false;
  $zahl = $zahl+1;
  $anfang = $anfang*10;
  $ende = $ende*10;

}
```

```
Finding Kaprekarconstants
    ...
1-stellig: ---
2-stellig:
3-stellig: 495,
4-stellig: 6174,
5-stellig:
6-stellig: 549945,  631764,
7-stellig:
```

Another example with running Lua to calculate and print the Pascal's triangle. The internal filename is available with

```
local filename = arg[0]
local shortFN = str:match("(.+)%..+")   -- delete extension
outFile = io.open(shortFN..".txt","w+") -- open external file
```

```
function nextrow(t)
  local ret = {}
  t[0], t[#t+1] = 0, 0
  for i = 1, #t do ret[i] = t[i-1] + t[i] end
  return ret
end

function triangle(n)
  t = {1}
  for i = 1, n do
    m = (n - i)
    for j = 1,m do outFile:write("    ") end
    for k = 1,i do outFile:write(string.format("%8s",t[k])) end
    outFile:write("\n")
    t = nextrow(t)
  end
```

voss-21.lua

```
end
```

```
triangle(10)
```

```
                                   1
                                1     1
                             1     2     1
                          1     3     3     1
                       1     4     6     4     1
                    1     5    10    10     5     1
                 1     6    15    20    15     6     1
              1     7    21    35    35    21     7     1
           1     8    28    56    70    56    28     8     1
        1     9    36    84   126   126    84    36     9     1
```

5.13 Running additional external programs

For a LaTeX additional programs for bibliography, index, a.s.o. maybe needed.

```
\define@boolkey{hv}[hv@extern@]{biber}[true]{}
\define@boolkey{hv}[hv@extern@]{xindex}[true]{}
\define@key{hv}{xindexOptions}[]{\def\hv@extern@xindexOptions{#1}}
\define@key{hv}{runsequence}[]{\def\hv@extern@runsequence{#1}}
```

The `biber` run needs no additional options, but for `xindex` it maybe useful. The following examples uses

```
\begin{externalDocument}[
  compiler=lualatex, runs=2, pages=2,crop,
  xindex, xindexOptions={-l DE --config AU},
  mpwidth=0.6\linewidth, usefancyvrb=false,
  docType=latex,
  ...
]{voss}
```

```
\usepackage{makeidx}\makeindex
\usepackage{hvindex}
```

```
Sort with xindex \verb|-l DE --config AU|
\Index{Österreich} \Index{Öresund}
\Index{Ostern} \Index{Ober} \Index{Oberin}
\Index{Österreich} \Index{Öresund}
\Index{Ödem} \Index{Oligarch} \Index{Oder}
\Index{Ostern} \Index{Ober} \Index{Oberin}
\Index{Obstler} \Index{Öl} \Index{ölen}
\Index{Oder|seealso{Fluss}} \Index{Göbel}
\Index{oder} \index{Fluss!Oder}
\Index{Goethe} \Index{Göthe} \Index{Götz}
\Index{Goldmann}
\printindex
```

Index

F
Fluss
    - Oder, 1

G
Goethe, 1
Goldmann, 1
Göbel, 1
Göthe, 1
Götz, 1

O
Ober, 1
Oberin, 1
Obstler, 1
oder, 1
Oder, 1, *siehe auch* Fluss
Oligarch, 1
Ostern, 1

Ö
Ödem, 1
Öl, 1
Öresund, 1
Österreich, 1

ö
ölen, 1

voss-22.tex

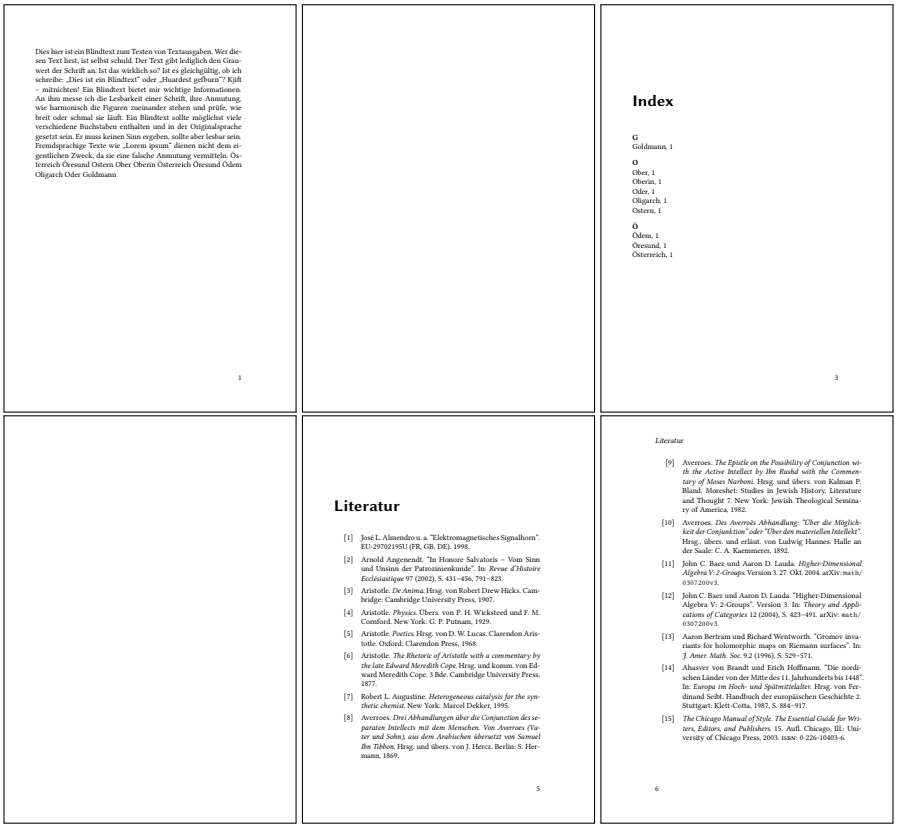
Instad of using the options `compiler`, `biber`, and `xindex` one can also use only the optional argument `runsequence` to define an individuell sequence of commands, e.g.:

```
runsequence={lualatex,biber,{xindex -l de -c AU},lualatex,lualatex}
```

voss-23.tex

```
\usepackage[ngerman]{babel}
\usepackage{libertinus,hvindex}
\usepackage{makeidx}\makeindex
\usepackage{biblatex}\addbibresource{biblatex-examples.bib}
```

```
\blindtext
\Index{Österreich} \Index{Öresund}
\Index{Ostern} \Index{Ober} \Index{Oberin}
\Index{Österreich} \Index{Öresund}
\Index{Ödem} \Index{Oligarch} \Index{Oder}
\Index{Goldmann}
\printindex
\nocite{*}\printbibliography
\blindtext
\blinddocument
```



Dies hier ist ein Blindtext zum Testen von Textausgaben. Wer diesen Text liest, ist selbst schuld. Der Text gibt lediglich den Grauwert der Schrift an. Ist das wirklich so? Ist es gleichgültig, ob ich schreibe: „Dies ist ein Blindtext" oder „Huardest gefburn"? Kjift – mitnichten! Ein Blindtext bietet mir wichtige Informationen. An ihm messe ich die Lesbarkeit einer Schrift, ihre Anmutung, wie harmonisch die Figuren zueinander stehen und prüfe, wie breit oder schmal sie läuft. Ein Blindtext sollte möglichst viele verschiedene Buchstaben enthalten und in der Originalsprache gesetzt sein. Er muss keinen Sinn ergeben, sollte aber lesbar sein. Fremdsprachige Texte wie „Lorem ipsum" dienen nicht dem eigentlichen Zweck, da sie eine falsche Anmutung vermitteln. Osterreich Öresund Ostern Ober Oberin Österreich Öresund Ödem Oligarch Oder Goldmann

1

3

Index

G
Goldmann, 1

O
Ober, 1
Oberin, 1
Oder, 1
Oligarch, 1
Ostern, 1

Ö
Ödem, 1
Öresund, 1
Österreich, 1

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5

Literatur

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[10] Averroes. *Des Averroës Abhandlung: "Über die Möglichkeit der Conjunktion" oder "Über den materiellen Intellekt"*. Hrsg., übers. und erläut. von Ludwig Hannes. Halle an der Saale: C. A. Kaemmerer, 1892.

[11] John C. Baez und Aaron D. Lauda. *Higher-Dimensional Algebra V: 2-Groups*. Version 3. 27. Okt. 2004. arXiv: math/0307200v3.

[12] John C. Baez und Aaron D. Lauda. "Higher-Dimensional Algebra V: 2-Groups". Version 3. In: *Theory and Applications of Categories* 12 (2004), S. 423–491. arXiv: math/0307200v3.

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[14] Ahasver von Brandt und Erich Hoffmann. "Die nordischen Länder von der Mitte des 11. Jahrhunderts bis 1448". In: *Europa im Hoch- und Spätmittelalter*. Hrsg. von Ferdinand Seibt. Handbuch der europäischen Geschichte 2. Stuttgart: Klett-Cotta, 1987, S. 884–917.

[15] *The Chicago Manual of Style. The Essential Guide for Writers, Editors, and Publishers*. 15. Aufl. Chicago, Ill.: University of Chicago Press, 2003. isbn: 0-226-10403-6.

6

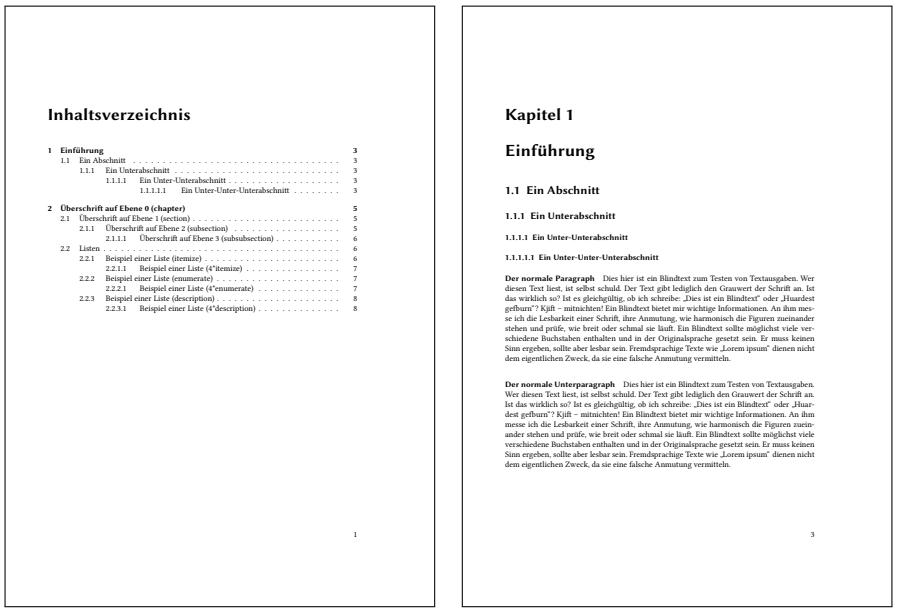
5.14 Using `listings`

The default is using `\lstinputlisting` for the printed code sequences.

```
\documentclass[chapterprefix=on,parskip=half-,DIV=12,fontsize=12pt]{scrbook
    }
\DeclareNewSectionCommand[
  style=section,
  level=4,
  beforeskip=-3.25ex plus -1ex minus -.2ex,
  afterskip=1.5ex plus .2ex,
  font=\normalsize,
  indent=0pt,
  counterwithin=subsubsection
]{subsubsubsection}
\RedeclareSectionCommand[
  level=5,
  toclevel=5,
  tocindent=13em,
  tocnumwidth=5.9em,
  counterwithin=subsubsubsection
]{paragraph}
\RedeclareSectionCommand[
  level=6,
  toclevel=6,
  tocindent=15em,
  tocnumwidth=6.8em
]{subparagraph}
\setcounter{secnumdepth}{\subsubsubsectionnumdepth}
\setcounter{tocdepth}{\subsubsubsectiontocdepth}
```

voss-24.tex

```
\tableofcontents
\chapter{Einführung}
\section{Ein Abschnitt}
\subsection{Ein Unterabschnitt}
\subsubsection{Ein Unter-Unterabschnitt}
\subsubsubsection{Ein Unter-Unter-Unterabschnitt}
\paragraph{Der normale Paragraph}
\blindtext
\subparagraph{Der normale Unterparagraph}
\blindtext
\blinddocument
```



Inhaltsverzeichnis

1

Kapitel 1

Einführung

1.1 Ein Abschnitt

1.1.1 Ein Unterabschnitt

1.1.1.1 Ein Unter-Unterabschnitt

1.1.1.1.1 Ein Unter-Unter-Unterabschnitt

Der normale Paragraph Dies hier ist ein Blindtext zum Testen von Textausgaben. Wer diesen Text liest, ist selbst schuld. Der Text gibt lediglich den Grauwert der Schrift an. Ist das wirklich so? Ist es gleichgültig, ob ich schreibe: „Dies ist ein Blindtext" oder „Huardest gefburn"? Kjift – mitnichten! Ein Blindtext bietet mir wichtige Informationen. An ihm messe ich die Lesbarkeit einer Schrift, ihre Anmutung, wie harmonisch die Figuren zueinander stehen und prüfe, wie breit oder schmal sie läuft. Ein Blindtext sollte möglichst viele verschiedene Buchstaben enthalten und in der Originalsprache gesetzt sein. Er muss keinen Sinn ergeben, sollte aber lesbar sein. Fremdsprachige Texte wie „Lorem ipsum" dienen nicht dem eigentlichen Zweck, da sie eine falsche Anmutung vermitteln.

Der normale Unterparagraph Dies hier ist ein Blindtext zum Testen von Textausgaben. Wer diesen Text liest, ist selbst schuld. Der Text gibt lediglich den Grauwert der Schrift an. Ist das wirklich so? Ist es gleichgültig, ob ich schreibe: „Dies ist ein Blindtext" oder „Huardest gefburn"? Kjift – mitnichten! Ein Blindtext bietet mir wichtige Informationen. An ihm messe ich die Lesbarkeit einer Schrift, ihre Anmutung, wie harmonisch die Figuren zueinander stehen und prüfe, wie breit oder schmal sie läuft. Ein Blindtext sollte möglichst viele verschiedene Buchstaben enthalten und in der Originalsprache gesetzt sein. Er muss keinen Sinn ergeben, sollte aber lesbar sein. Fremdsprachige Texte wie „Lorem ipsum" dienen nicht dem eigentlichen Zweck, da sie eine falsche Anmutung vermitteln.

3

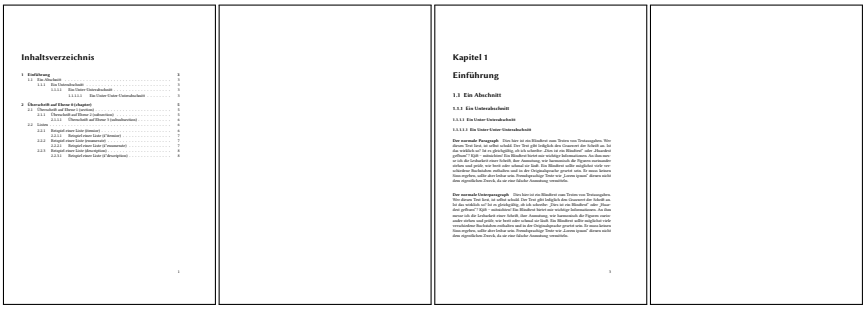
It also possible to use \VerbatimInput from package fancyvrb. In general it makes no difference using the optional argument usefancyvrb or not.

voss-25.tex

```
\documentclass[chapterprefix=on,parskip=half-,DIV=12,fontsize=12pt]{scrbook}
\DeclareNewSectionCommand[
  style=section,
  level=4,
  beforeskip=-3.25ex plus -1ex minus -.2ex,
  afterskip=1.5ex plus .2ex,
  font=\normalsize,
  indent=0pt,
  counterwithin=subsubsection
]{subsubsubsection}
\RedeclareSectionCommand[
  level=5,
  toclevel=5,
  tocindent=13em,
  tocnumwidth=5.9em,
  counterwithin=subsubsubsection
]{paragraph}
\RedeclareSectionCommand[
  level=6,
  toclevel=6,
  tocindent=15em,
  tocnumwidth=6.8em
]{subparagraph}
\setcounter{secnumdepth}{\subsubsubsectionnumdepth}
\setcounter{tocdepth}{\subsubsubsectiontocdepth}
```

```
\tableofcontents
\chapter{Einführung}
```

```
\section{Ein Abschnitt}
\subsection{Ein Unterabschnitt}
\subsubsection{Ein Unter-Unterabschnitt}
\subsubsubsection{Ein Unter-Unter-Unterabschnitt}
\paragraph{Der normale Paragraph}
\blindtext
\subparagraph{Der normale Unterparagraph}
\blindtext
\blinddocument
```



5.15 Vertical space

```
\define@key{hv}{aboveskip}[\medskipamount]{%
        \setlength\hv@extern@aboveskip{#1}}
\define@key{hv}{belowpreambleskip}[\smallskipamount]{%
        \setlength\hv@extern@belowpreambleskip{#1}}
\define@key{hv}{belowbodyskip}[\smallskipamount]{%
        \setlength\hv@extern@belowbodyskip{#1}}
\define@key{hv}{belowskip}[\medskipamount]{%
        \setlength\hv@extern@belowskip{#1}}
```

aboveskip Vertical space *before* the environment `externalDocument` or the command `\runExtCmd` (default `\medskipamount`)

belowpreambleskip Vertical space between preamble and body (default `\smallskipamount`)

belowbodyskip Vertical space between body and output (default `\smallskipamount`)

belowskip Vertical space *after* the environment `externalDocument` or the command `\runExtCmd` (default `\medskipamount`)

The listings environment uses its own keywords `aboveskip` and `belowskip`, also preset to `\medskipamount`. These ones can be changed by using the keyword `lstOptions`:

```
..., lstOptions = {aboveskip=..., belowskip=...}, ...
```

5.16 No output

By default there is an image or text as output of the external run. In a case, where you are only interested in the code, which should be formatted in the same style as other examples, you can set `showoutput` to false.

```
\documentclass[chapterprefix=on,parskip=half-,DIV=12,fontsize=12pt]{scrbook}
\DeclareNewSectionCommand[
  style=section,
  level=4,
  beforeskip=-3.25ex plus -1ex minus -.2ex,
  afterskip=1.5ex plus .2ex,
  font=\normalsize,
  indent=0pt,
  counterwithin=subsubsection
]{subsubsubsection}
```

voss-26.tex

```
\tableofcontents
\chapter{Einführung}
\section{Ein Abschnitt}
\subsection{Ein Unterabschnitt}
\subsubsection{Ein Unter-Unterabschnitt}
\subsubsubsection{Ein Unter-Unter-Unterabschnitt}
\blindtext
```

6 Defining new marker

Suppose you do not want for a LaTeX document the complete body part between `\begin` and `\end` printed. In this case you can define own markers, e.g.:

```
\defMarkerType{ltx}
  {\perCent StartVisibleBody}
  {\perCent StopVisibleBody}
  {\perCent StartVisiblePreamble}
  {\perCent StopVisiblePreamble}
```

Whith this definition and the setting `docType=ltx` the last example looks like:

```
\DeclareNewSectionCommand[
  style=section,
  level=4,
  beforeskip=-3.25ex plus -1ex minus -.2ex,
  afterskip=1.5ex plus .2ex,
  font=\normalsize,
  indent=0pt,
  counterwithin=subsubsection
]{subsubsubsection}
```

voss-27.tex

```
\subsubsubsection{Ein Unter-Unter-Unterabschnitt}
```

Inhaltsverzeichnis

7 Supported engines

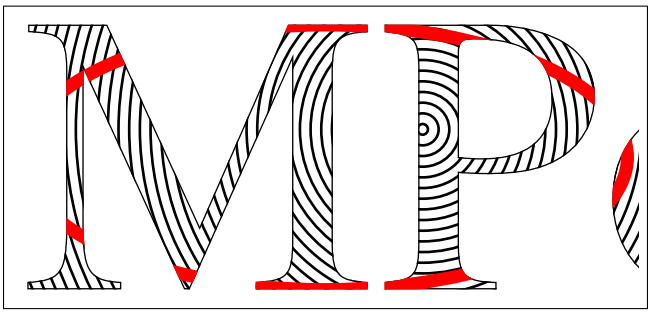
7.1 METAPOST example

Needs the run sequence setting to get a `pdf` from the created `dvi` output. It is already internally defined.

```
defaultfont:="ptmr8r";
warningcheck:=0;
```

voss-28.mp

```
draw fullcircle shifted (0.5,0.6) xscaled 8cm yscaled 3.5cm
  withpen pencircle scaled 5bp withcolor red;
special( " /Times-Roman findfont 150 scalefont setfont " &
  " 0 10 moveto (MPost) false charpath clip stroke gsave 150 70 translate "
      &
  " 2 4 600 {dup 0 moveto 0 exch 0 exch 0 360 arc stroke} for grestore ");
```



7.2 plainTEX example

Needs the run sequence setting to get a `pdf` from the created `dvi` output. It is already internally defined.

voss-29.tex

```
\footline={\footsc the electronic journal of combinatorics
   {\footbf 16} (2009), \#R00\hfil\footrm\folio}
```

```
\font\bigrm=cmr12 at 14pt
\centerline{\bigrm An elementary proof of the reconstruction conjecture}

\bigskip\bigskip
\centerline{D. Remifa\footnote*{Thanks to the editors of this journal!}}
\smallskip
\centerline{Department of Inconsequential Studies}
\centerline{Solatido College, North Kentucky, USA}
\centerline{\tt remifa@dis.solatido.edu}
\bigskip
\centerline{\footrm
Submitted: Jan 1, 2009; Accepted: Jan 2, 2009; Published: Jan 3, 2009}
\centerline{\footrm Mathematics Subject Classifications: 05C88, 05C89}
\bigskip\bigskip
\centerline{\bf Abstract}
\smallskip
{\narrower\noindent
The reconstruction conjecture states that the multiset of unlabeled
vertex-deleted subgraphs of a graph determines the graph, provided it
has at least 3 vertices.  A version of the problem was first stated
by Stanis\l aw Ulam.  In this paper, we show that the conjecture can
be proved by elementary methods.  It is only necessary to integrate
the Lenkle potential of the Broglington manifold over the quantum
supervacillatory measure in order to reduce the set of possible
counterexamples to a small number (less than a trillion).  A simple
computer program that implements Pipletti's classification theorem
for torsion-free Aramaic groups with simplectic socles can then
finish the remaining cases.}

\bigskip
\beginsection 1. Introduction.

This is the start of the introduction.
```

An elementary proof of the reconstruction conjecture

D. Remifa*
Department of Inconsequential Studies
Solatido College, North Kentucky, USA
remifa@dis.solatido.edu

Submitted: Jan 1, 2009; Accepted: Jan 2, 2009; Published: Jan 3, 2009
Mathematics Subject Classifications: 05C88, 05C89

Abstract

The reconstruction conjecture states that the multiset of unlabeled vertex-deleted subgraphs of a graph determines the graph, provided it has at least 3 vertices. A version of the problem was first stated by Stanislaw Ulam. In this paper, we show that the conjecture can be proved by elementary methods. It is only necessary to integrate the Lenkle potential of the Broglington manifold over the quantum supervacillatory measure in order to reduce the set of possible counterexamples to a small number (less than a trillion). A simple computer program that implements Pipletti's classification theorem for torsion-free Aramaic groups with simplectic socles can then finish the remaining cases.

1. Introduction.

This is the start of the introduction.

* Thanks to the editors of this journal!

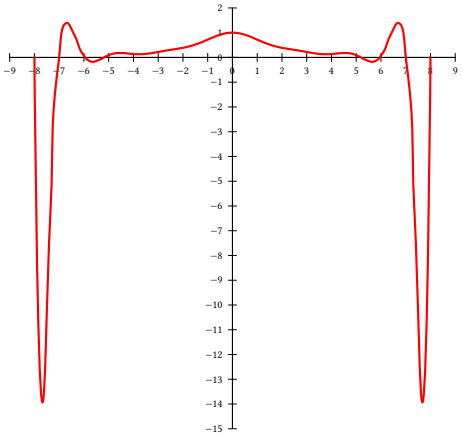
7.3 LuaLaTeX example

With LuaLaTeX and and using PostScript code the intermediate GhostScript run is not needed. The `pdf` is directly created.

```
\usepackage{fontenc}\usepackage{libertinus}
\usepackage{pst-all}
```

voss-30.tex

```
\psset{unit=0.8cm}
\begin{pspicture}(-9,-15)(9,2)
\psaxes(0,0)(-9,-15)(9,2)
\psplot[algebraic,plotstyle=curve,curvature=1 1 0,
  linewidth=2pt,linecolor=red]{-8}{8}{
  1 - 3876218985722260225*x^2/1089211474407398617 6
    + 14975974793271450625*x^4/1742738359051837788 16
    - 31709542095829687 5*x^6/26811359370028273664
    + 19441297092070312 5*x^8/21449087496022618931 2
    - 2090988251953125*x^10/53622718740056547328
    + 99480224609375*x^12/107245437480113094656
    - 7879638671875*x^14/697095343620735115264
    + 152587890625*x^16/27883813744824940461056}
\end{pspicture}
```



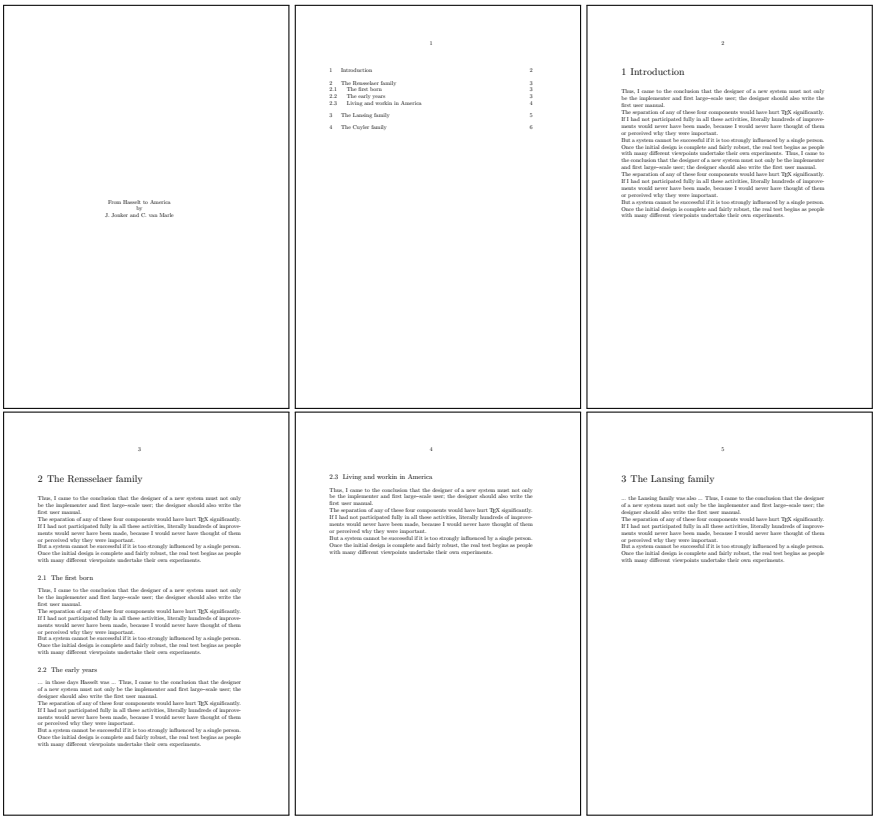
7.4 ConTEXt example

```
\definehead
  [myhead]
  [section]
\setuphead
  [myhead]
  [numberstyle=bold,
   textstyle  =bold,
   before     =\hairline\blank,
   after      =\nowhitespace\hairline]
```

voss-31.tex

```
\startstandardmakeup
\midaligned{From Hasselt to America}
\midaligned{by}
\midaligned{J. Jonker and C. van Marle}
\stopstandardmakeup
\placecombinedlist[content]
\chapter{Introduction}
\input knuth \input knuth
\chapter[rensselaer]{The Rensselaer family}
\input knuth
\section{The first born}
\input knuth
\section{The early years}
... in those days Hasselt was ...
\input knuth
\section{Living and workin in America}
\input knuth
\chapter[lansing]{The Lansing family}
... the Lansing family was also ...
\input knuth
\chapter[cuyler]{The Cuyler family}
... much later Tydeman Cuyler ...
\input knuth
\myhead[headlines]{And the end of all}
```

```
foo
```



8 Running external commands

Integrating the current directory of this document we can use the macro `\runExtCmd` with the optional argument `redirect`

```
\runExtCmd[redirect]{ls -la}{voss}
```

to get the directory listed:

```
total 4912
drwxr-xr-x   18 voss  staff      576 24 Aug 21:21 .
drwxr-xr-x  191 voss  staff     6112 24 Aug 21:10 ..
drwxr-xr-x    3 voss  staff       96 24 Apr  2022 .ctan
drwxr-xr-x    4 voss  staff      128 27 Apr  2022 .test
-rw-r--r--    1 voss  staff     2099 24 Aug 21:12 Changes
drwxr-xr-x  102 voss  staff     3264 24 Aug 21:21 Exa
-rwxrwxrwx    1 voss  staff     1169 24 Aug 21:21 Makefile
-rw-rw-rw-    1 voss  staff      713 27 Mai  2022 README
-rwxrwxrwx    1 voss  staff     3998 27 Mai  2022 hvdoctools.sty
-rwxr-xr-x    1 voss  staff     1040 21 Jul  2022 hvextern-checkfile.lua
-rw-r--r--    1 voss  staff    16384 24 Aug 21:21 hvextern.aux
-rw-r--r--    1 voss  staff     8192 24 Aug 21:21 hvextern.idx
```

```
-rw-r--r--    1 voss  staff   160306 24 Aug 21:21 hvextern.log
-rw-r--r--    1 voss  staff      727 20 Jun  2022 hvextern.lua
-rw-r--r--@   1 voss  staff  1292219 24 Aug 21:21 hvextern.pdf
-rw-r--r--    1 voss  staff    45064 24 Aug 21:10 hvextern.sty
-rw-r--r--    1 voss  staff    52415 24 Aug 21:21 hvextern.tex
-rw-r--r--    1 voss  staff        0 24 Aug 21:21 hvextern.toc
```

```
\runExtCmd[redirect,verbose,lstOptions={basicstyle=\ttfamily\small}]{df}{voss}
```

```
Filesystem                                                    512-blocks       Used
      Available Capacity   iused      ifree %iused  Mounted on
/dev/disk3s3s1                                                 965595304   19028704
      360132472     6%    382506 1800662360    0%   /
devfs                                                                 410        410
              0   100%       710          0  100%   /dev
/dev/disk3s6                                                   965595304    2097192
      360132472     1%         1 1800662360    0%   /System/Volumes/VM
/dev/disk3s4                                                   965595304   11118328
      360132472     3%      1175 1800662360    0%   /System/Volumes/Preboot
/dev/disk3s2                                                   965595304     156552
      360132472     1%        44 1800662360    0%   /System/Volumes/Update
/dev/disk1s2                                                     1024000      12328
         981448     2%         1    4907240    0%   /System/Volumes/xarts
/dev/disk1s1                                                     1024000      12472
         981448     2%        32    4907240    0%   /System/Volumes/iSCPreboot
/dev/disk1s3                                                     1024000       8032
         981448     1%        71    4907240    0%   /System/Volumes/Hardware
/dev/disk3s1                                                   965595304  571032896
      360132472    62%   3054785 1800662360    0%   /System/Volumes/Data
map auto_home                                                         0          0
              0   100%         0          0     -   /System/Volumes/Data/home
//Herbert%20Voß@AirPort%20Chicago._afpovertcp._tcp.local./Data  3902834784 1928398024
     1974436760    50% 241049751  246804595   49%   /Volumes/.timemachine/AirPort
     Chicago._afpovertcp._tcp.local./780152FA-9F4A-451C-B1F0-ECC5A235447A/Data
/dev/disk5s1                                                  3707283368 1728970048
     1974436760    47%   2665103 9872183800    0%   /Volumes/Backups von Herberts
     MacBook Pro
com.apple.TimeMachine.2022-10-27-123947.backup@/dev/disk5s1     3707283368  310367432
     1974436760    14%   2079093 9872183800    0%
     /Volumes/.timemachine/F1EA5025-1F5A-4C49-B333-040D92413749/2022-10-27-123947.backup
```

9 Other options

vshift A length for a vertical shift of the object, only valid for the inline mode. See document source of example on page 3.

force=false can speed up the comiling time for the document. If a created image/output already exists, there is no need to create it with the next run again and again. *T*his option is not valid if the package option checkCode exists.

cleanup the auxiliary files of a LaTeX-run are deleted, preset to aux, log. It must be a comma seperated list of the extensions of the main file, s.g. cleanup={aux,log}.

moveToExampleDir name of a directory for the examples, must first be created by the user himself

ExampleDir move all examples into a directory

tclbox=false Can be used if there are some negative interactions between package `listings` and package `tcolorbox`.

framesep Value for `\fbox` if keyword `frame` is used.

mpsep Distance between code and output (default 1 em).

pagesep Distance between pages for multipage output (default 1 em).

verbose Print control messages into the terminal and logfile.

eps create an eps from the pdf (historical).

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