

stmtikz package description

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v20230914

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These are the tikz definitions for `stmlatex`. It is build upon the [tikz](#) package.

Contents

1. Usage - in the preamble	1
1.1. Load the whole <code>stmtikz</code> package	1
1.1.1. Description	1
1.1.2. Options	1
1.2. <code>stmtikzlibraries</code>	2
1.3. <code>stmtikzstyles</code>	3
1.4. <code>stmtikzexternalization</code>	3
1.4.1. Description	3
1.4.2. Options	3
2. Externalization	3
3. Known issues	4
A. The code	5
A.1. <code>stmtikz.sty</code>	5
A.2. <code>stmtikzbase.sty</code>	7
A.3. <code>stmtikzlibraries.sty</code>	8
A.4. <code>stmtikzstyles.sty</code>	10
A.5. <code>stmtikzexternalization.sty</code>	14

1. Usage - in the preamble

1.1. Load the whole `stmtikz` package

1.1.1. Description

This is an interface package which loads `tikz` and definitions commonly required throughout document creation.

By default the package loads

- `stmtikzbase.sty`
- `stmtikzlibraries.sty`
- `stmtikzstyles.sty`
- `stmtikzexternalization.sty`

See subsection 1.1.2 for options to change the default package behavior.

1.1.2. Options

Option *libraries* This is a boolean option. Expected values are either `true` or `false`. It controls whether to load the standard libraries commonly required.

```
\usepackage[libraries=true|false]{stmtikz}
```

`libraries=true` is the default. It is used in case `libraries=false` is not set explicitly.

Option *styles* This is a boolean option. Expected values are either `true` or `false`. It controls whether to load the predefined `tikz` styles.

```
\usepackage[styles=true|false]{stmtikz}
```

`styles=true` is the default. It is used in case `styles=false` is not set explicitly.

Option *externalization* This is a boolean option. Expected values are either `true` or `false`. It enables and disables the possibilities for the externalization of `tikzpictures`.

```
\usepackage[externalization=true|false]{stmtikz}
```

`externalization=true` is the default. It is used in case `externalization=false` is not set explicitly.

By default, global externalization is not set by the package. Thus it is required to use `\tikzexternalenable` before the first picture, which is to be created with this feature. See Option *globaleexternalization* for a possibility to allow a global externalization of throughout the document.

Option *externalizationoutputfolder* This option expects a string input. Do not add a slash at the end of the string.

With this option it is possible to define a output folder for all externalized `tikzpictures` in case Option *externalization* has the value `true`. The folder location is set relative to the directory of the main `tex`-file.

```
\usepackage[externalizationoutputfolder=$FOLDERNAME$]{stmtikz}
```

The default is `externalizationoutputfolder=ZZZ_TikZ`.

Option *globaleexternalization* This is a boolean option. Expected values are either `true` or `false`.

By default externalization is not enabled for `tikzpictures` globally, meaning automatically activated for each `tikzpicture`. It has to be activated explicitly in the document with `\tikzexternalenable`.

It is possible to control this behavior with

```
\usepackage[globaleexternalization=true|false]{stmtikz}
```

`globaleexternalization=false` is the default. It is used in case `globaleexternalization=true` is not set explicitly.

Global externalization is active until the next `\tikzexternaldisable` in your document.

1.2. `stmtikzlibraries`

This package contains standard libraries commonly required in the creation of `tikzpictures`.

1.3. `stmtikzstyles`

This package contains styles commonly required in the creation of `tikzpictures`.

1.4. `stmtikzexternalization`

1.4.1. Description

This package enables the externalization of `tikzpictures`.

It requires shell escape. Enabling shell escape is achieved by using the `-shell-escape` command line option when executing `LATEX` or `pdfLATEX`, e.g.

```
pdflatex -shell-escape stmtikz.tex
```

or with `arara`

```
arara: pdflatex: {shell: yes}
```

1.4.2. Options

Option *outputfolder* This option expects a string input. Do not add a slash at the end of the string.

With this option it is possible to define a output folder for all externalized `tikzpictures`. The folder location is set relative to the directory of the main `tex`-file.

```
\usepackage[outputfolder=$FOLDERNAME$]{stmtikzexternalization}
```

The default is `outputfolder=ZZZ_TikZ`.

Option *globaleexternalization* This is a boolean option. Expected values are either `true` or `false`.

By default externalization is not enabled for `tikzpictures` globally, meaning automatically activated for each `tikzpicture`. It has to be activated explicitly in the document with `\tikzexternalenable`.

It is possible to control this behavior with

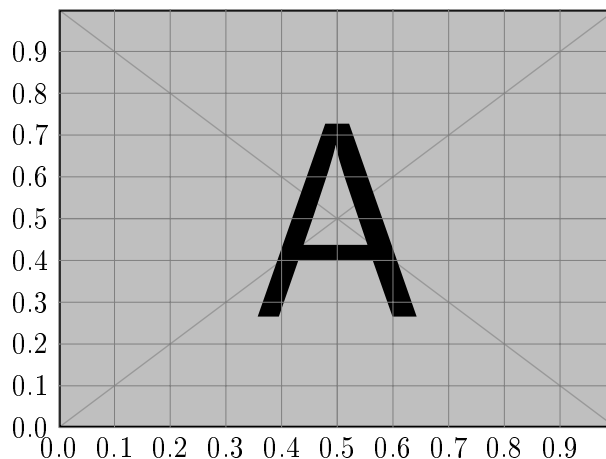
```
\usepackage[globaleexternalization=true|false]{stmtikzexternalization}
```

`globaleexternalization=false` is the default. It is used in case `globaleexternalization=true` is not set explicitly.

Global externalization is active until the next `\tikzexternaldisable` in your document.

2. Externalization

This is a test for the externalization of a `tikzpicture`.



3. Known issues

misplaced `\printindex` error.

- There is an issue with the externalization of `tikzpictures` in case the `imakeidx` package is used.
- There are two possibilities:
 1. Load the `imakeidx` before any call to `stmtikzexternalization`

```
\usepackage{imakeidx}
\usepackage[externalization=true]{stmtikz}
```
 2. Load the package without externalization and load the feature after the call to `imakeidx`

```
\usepackage[externalization=false]{stmtikz}
\usepackage{imakeidx}
\usepackage{stmtikzexternalization}
```

A. The code

A.1. stmtikz.sty

```
1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This is a interface to all stm tikz definitions
6 % Based upon the tikz package:
7 %   https://ctan.org/pkg/tikz
8 %
9 % Usage
10 % - Preamble:
11 %   - \usepackage{stmtikz}
12 %
13 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14 %               Initial draft
15 %
16 % Contact:   Martin Raedel, martin.raedel@dlr.de
17 %               DLR Lightweight Systems
18 %
19 %               _ _/ | _ _
20 %               / _/ _/ _/
21 %               www.dlr.de/sy/en   | / DLR
22 %
23 % Copyright (C) 2019-... DLR Lightweight Systems
24 %
25 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26 % Content %
27 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX version 2e.
30 \NeedsTeXFormat{LaTeX2e}
31
32 % Provide the name of your page, the date it was last updated, and a
33 %   comment about what it's used for
34
35 \ProvidesPackage{stmtikz}[2023/02/12 STMs custom LaTeX tikz definitions]
36
37 % -----
38 % Options
39 % -----
40
41 % For options
```

```

40 \@ifpackageloaded{kvoptions}{\RequirePackage{kvoptions}}%
41
42 % Option group
43 \SetupKeyvalOptions{%
44   family=stmtikz,%
45   prefix=stmtikz@,%
46   setkeys=\kvsetkeys,%
47 }
48
49 % Libraries
50 \DeclareBoolOption[true]{libraries}
51
52 % Styles
53 \DeclareBoolOption[true]{styles}
54
55 % Externalization
56 \DeclareBoolOption[true]{externalization}
57
58 % Global externalization
59 \DeclareBoolOption[false]{globalexternalization}
60
61 % Output folder
62 \DeclareStringOption[ZZZ_TikZ]{externalizationoutputfolder}
63
64 % Process options
65 \ProcessKeyvalOptions{stmtikz}
66
67 % -----
68 % Modules
69 % -----
70
71 % Load the base package
72 \@ifpackageloaded{stmtikzbase}{\%
73   \RequirePackage{stmtikzbase}%
74 }%
75
76 % Libraries
77 \ifstmtikz@libraries
78   \RequirePackage{stmtikzlibraries}
79 \fi
80
81 % Styles
82 \ifstmtikz@styles
83   \RequirePackage{stmtikzstyles}

```

```

84 \fi
85
86 % Externalization
87 \ifstmtikz@externalization
88   \@ifpackageloaded{stmtikzexternalization}{\fi}{
89     \RequirePackage[%
90       outputfolder=\stmtikz@externalizationoutputfolder,
91       global={\ifstmtikz@globalexternalization true\else false\fi}
92     ]{stmtikzexternalization}
93   }
94 \fi
95
96 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
97 % That's it
98 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
99
100 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
    this file. LaTeX will ignore anything after this line.
101 \endinput

```

A.2. stmtikzbase.sty

```

1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This is a interface to stm base tikz package
6 % Based upon the tikz package:
7 %   https://ctan.org/pkg/tikz
8 %
9 % Usage
10 % - Preamble:
11 %   - \usepackage{stmtikzbase}
12 %
13 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14 %               Initial draft
15 %
16 % Contact:   Martin Raedel, martin.raedel@dlr.de
17 %           DLR Lightweight Systems
18 %
19 %           __/|__
20 %           /_/_/_/
21 %           www.dlr.de/sy/en   | / DLR
22 %

```



```

23 % Copyright (C) 2019-... DLR Lightweight Systems
24 %
25 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26 % Content %
27 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX version 2e.
30 \NeedsTeXFormat{LaTeX2e}
31
32 % Provide the name of your page, the date it was last updated, and a
    comment about what it's used for
33 \ProvidesPackage{stmtikzbase}[2023/02/12 STMs custom LaTeX tikz
    definitions]
34
35 % -----
36 % Package
37 % -----
38
39 \@ifpackageloaded{tikz}{\RequirePackage{tikz}}%
40
41 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
42 % That's it %
43 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
44
45 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
    this file. LaTeX will ignore anything after this line.
46 \endinput

```

A.3. stmtikzlibraries.sty

```

1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This file includes unit definitions.
6 % Based upon the tikz package:
7 %   https://ctan.org/pkg/tikz
8 %
9 % Usage
10 % - Preamble:
11 %   - \usepackage{stmtikzlibraries}
12 %
13 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14 %               Initial draft

```

```

15 %
16 % Contact:   Martin Raedel,   martin.raedel@dlr.de
17 %           DLR Lightweight Systems
18 %
19 %           _ _/|_ _
20 %           /_/_/_/_/
21 %           www.dlr.de/sy/en   | / DLR
22 %
23 % Copyright (C) 2019-... DLR Lightweight Systems
24 %
25 %%%%%%%%%%%
26 % Content                                     %
27 %%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX version 2e.
30 \NeedsTeXFormat{LaTeX2e}
31
32 % Provide the name of your page, the date it was last updated, and a
33 %   comment about what it's used for
34 \ProvidesPackage{stmtikzlibraries}[2023/02/12 STMs custom LaTeX tikz
35 %   library definitions]
36
37 % -----
38 % Package
39 % -----
40
41 \@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
42
43 % -----
44 % Libraries
45 % -----
46
47 \usetikzlibrary{arrows.meta}
48 \usetikzlibrary{backgrounds}
49 \usetikzlibrary{calc}
50 \usetikzlibrary{decorations.markings}
51 \usetikzlibrary{decorations.text}
52 \usetikzlibrary{fit}
53 \usetikzlibrary{intersections}
54 \usetikzlibrary{tikzmark}
55 \usetikzlibrary{trees}
56 \usetikzlibrary{matrix}
57 \usetikzlibrary{mindmap}
58 \usetikzlibrary{patterns}

```

```

57 \usetikzlibrary{positioning}
58 \usetikzlibrary{shadows}
59 \usetikzlibrary{shadows.blur}
60 \usetikzlibrary{shapes}
61 \usetikzlibrary{shapes.misc}
62 \usetikzlibrary{spy}
63
64 % -----
65 % Pgfmath
66 % -----
67
68 % Stuff for calc compatiability.
69 \let\real=\pgfmath@calc@real
70 \let\minof=\pgfmath@calc@minof
71 \let\maxof=\pgfmath@calc@maxof
72 \let\ratio=\pgfmath@calc@ratio
73 \let\widthof=\pgfmath@calc@widthof
74 \let\heightof=\pgfmath@calc@heightof
75 \let\depthof=\pgfmath@calc@depthof
76
77 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
78 % That's it %
79 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
80
81 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
   this file. LaTeX will ignore anything after this line.
82 \endinput

```

A.4. stmtikzstyles.sty

```

1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This is a interface to all stm tikz definitions
6 % Based upon the tikz package:
7 %   https://ctan.org/pkg/tikz
8 %
9 % Usage
10 % - Preamble:
11 %   - \usepackage{stmtikzstyles}
12 %
13 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14 %               Initial draft

```

```

15 %
16 % Contact:   Martin Raedel,   martin.raedel@dlr.de
17 %           DLR Lightweight Systems
18 %
19 %           _ _/|_ _
20 %           /_/_/_/_/
21 %           www.dlr.de/sy/en   | / DLR
22 %
23 % Copyright (C) 2019-... DLR Lightweight Systems
24 %
25 %%%%%%%%%%%
26 % Content                                     %
27 %%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX version 2e.
30 \NeedsTeXFormat{LaTeX2e}
31
32 % Provide the name of your page, the date it was last updated, and a
    comment about what it's used for
33 \ProvidesPackage{stmtikzstyles}[2023/02/12 STMs custom LaTeX tikz style
    definitions]
34
35 % -----
36 % Package
37 % -----
38
39 \@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
40 \@ifpackageloaded{stmcolors}{}{\RequirePackage{stmcolors}}%
41
42 % -----
43 % Pgfkeys
44 % -----
45
46 % From the pgf manual 2.10csv page 694:
47 %
48 %     It should be noted that all calculations must not exceed
    +-16383.99999 at any point, because the underlying computations rely
    on TeX dimensions. This means that many of the underlying computations
    are necessarily approximate and that in addition, are not very fast.
    TeX is, after all, a typesetting language and not ideally suited to
    relatively advanced mathematical operations. However, it is possible
    to change the computations as described in Section 76.
49 %
50 % From the TeX Book page 114:

```

```

51 %
52 %     16383.99998pt (TeX's largest dimen)
53 %
54 % In Notes On Programming in TeX Chirstian Feuersaenger pointed out
55 %
56 %     The \dimen registers perform their arithmetic's internally with 32
    bit scaled integers, so called scaled point with unit sp. It holds 1pt
    = 65536sp = 216sp. One of the 32 bits is used as sign. The total
    number range in pt is  $[-(2^{30}-1)/2^{16}, (2^{30}-1)/2^{16}] = [-16383.9998, +16383.9998]1$ .
57 %
58 %     1 Please note that this does not cover the complete range of a 32
    bit integer, I do not know why
59 % \pgfkeys{/pgf/fpu=true}                                % Allow pgf to plot
    values larger than 16383.9998
60 % \tikzset{fpu}                                           % Allow pgf to plot
    values larger than 16383.9998
61
62 \pgfkeys{/tikz/savenumber/.code 2 args={\global\edef#1{#2}}}
63
64 % -----
65 % Styles
66 % -----
67
68 % Help grid for external images
69 % Call inside scope with: \pic{stmimagegrid};
70 \tikzset{%
71   stmimagegrid/.pic={%
72     \draw[help lines,xstep=.1,ystep=.1] (0,0) grid (1,1);%
73     \foreach \x in {0,1,...,9} {\node [anchor=north] at (\x/10,0) {0.\x};}%
74     \foreach \y in {0,1,...,9} {\node [anchor=east] at (0,\y/10) {0.\y};}%
75   }%
76 }
77
78 % Default arrow tip
79 \tikzset{
80   stmdefaultarrow/.style={                                % Define arrow style
81     >=Stealth,                                           % >=latex
82   }
83 }
84
85 % A cross for markings in plots

```

```

86 % https://tex.stackexchange.com/a/124064
87 \tikzset{%
88     cross/.style={%
89         cross out,%
90         draw,%
91         minimum size=2*(#1-\pgflinewidth),%
92         inner sep=0pt,%
93         outer sep=0pt,%
94     }%
95 }%
96
97 % Beamer overlay feature
98 % https://tex.stackexchange.com/a/146991/44634
99 \tikzset{%
100     invisible/.style={%
101         opacity=0,%
102         text opacity=0%
103     },%
104     visible on/.style={%
105         alt={%
106             #1{}\invisible}%
107         }%
108     },%
109     alt/.code args={<#1>#2#3}{%
110         \alt<#1>\pgfkeysalso{#2}\pgfkeysalso{#3}} % \pgfkeysalso doesn't
111         change the path
112     },
113 }
114 \tikzset{%
115     stmmarkuptext/.style={%
116         text=stmmarkupcolor,%
117     }%
118 }
119
120 % Markup style for rectangles on external figures
121 \tikzset{%
122     stmrectangularmarkup/.style={%
123         inner sep=0pt,% necessary for correct positioning of corners
124         draw=stmmarkupcolor,%
125         thick,%
126     }%
127 }
128

```

```

129 % Equal space decoration markers along addplot path
130 % http://tex.stackexchange.com/a/232010/44634
131 \tikzset{
132   nomorepostactions/.code={\let\tikz@postactions=\pgfutil@empty},
133   stmmark/.style 2 args={decoration={markings,
134     mark= between positions 0 and 1 step (1/11)*\pgfdecoratedpathlength
135     with{%
136       \tikzset{#2,every mark}\tikz@options
137       \pgfuseplotmark{#1}%
138     },
139     postaction={decorate},
140     /pgfplots/legend image post style={
141       mark=#1,
142       #2,
143       every path/.append style={nomorepostactions}
144     },
145   },
146 }
147
148 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
149 % That's it %
150 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
151
152 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
153 % this file. LaTeX will ignore anything after this line.
154 \endinput

```

A.5. stmtikzexternalization.sty

```

1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This is a interface to tikz externalization definitions.
6 % All TikZ output is written to 'ZZZ_TikZ' folder.
7 % Based upon the tikz package:
8 %   https://ctan.org/pkg/tikz
9 %
10 % Usage
11 %   - Preamble:
12 %     - \usepackage{stmtikzexternalization}
13 %
14 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>

```

```

15 % Initial draft
16 %
17 % Contact: Martin Raedel, martin.raedel@dlr.de
18 % DLR Lightweight Systems
19 %
20 %          _ _/|_ _
21 %         / _/_/_/_/
22 %      www.dlr.de/sy/en      | / DLR
23 %
24 % Copyright (C) 2019-... DLR Lightweight Systems
25 %
26 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
27 % Content %
28 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
29
30 % Declare that this style file requires at least LaTeX version 2e.
31 \NeedsTeXFormat{LaTeX2e}
32
33 % Provide the name of your page, the date it was last updated, and a
    comment about what it's used for
34 \ProvidesPackage{stmtikzexternalization}[2023/02/12 STMs custom LaTeX
    tikz externalization definitions]
35
36 % -----
37 % Package
38 % -----
39
40 \@ifpackageloaded{tikz}{\RequirePackage{tikz}}%
41
42 % -----
43 % Options
44 % -----
45
46 % Options package
47 \@ifpackageloaded{kvoptions}{\RequirePackage{kvoptions}}%
48
49 % Option group
50 \SetupKeyvalOptions{%
51   family=stmtikzexternalization,%
52   prefix=stmtikzexternalization@,%
53   setkeys=\kvsetkeys,%
54 }
55
56 % Externalization

```



```

57 \DeclareBoolOption[false]{global}
58
59 % Output folder
60 \DeclareStringOption[ZZZ_TikZ]{outputfolder}
61
62 % Process options
63 \ProcessKeyvalOptions{stmtikzexternalization}
64
65 % -----
66 % Libraries
67 % -----
68
69 \usetikzlibrary{external}
70
71 % -----
72 % Settings
73 % -----
74
75 \tikzexternalize[%
76   mode=convert with system call,%
77   shell escape=-enable-write18,% % Use for MiKTeX
78 ]
79
80 % Output folder
81 \tikzsetexternalprefix{\stmtikzexternalization@outputfolder/}
82
83 % Set
84 \tikzset{%
85   external/system call={%
86     pdflatex \tikzexternalcheckshellescape -halt-on-error %
87     -interaction=batchmode -jobname "\image" "\texsource" %&& %
88     %convert -density 600 -transparent white "\image.pdf" "\image.png" %
89     %magick -density 600 -transparent white "\image.pdf" "\image.png" %
90     %for ImageMagick versions <7
91     %magick -density 600 -transparent white "\image.pdf" "\image.png" %
92     %for ImageMagick versions >= 7
93   }
94 }
95
96 % By default, do not allow global externalization
97 \ifstmtikzexternalization@global
98 \tikzexternalenable
99 \else
100 \tikzexternaldisable
101 \fi

```

```

99
100 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
101 % That's it %
102 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
103
104 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
    this file. LaTeX will ignore anything after this line.
105 \endinput

```