

stmtikz package description

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These are the tikz definitions for `stmlatex`. It is build upon the tikz package.

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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

- `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 *globalexternalization* 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 explicetely in the document with `\tikzexternalenable`.

It is possible to control this behavior with

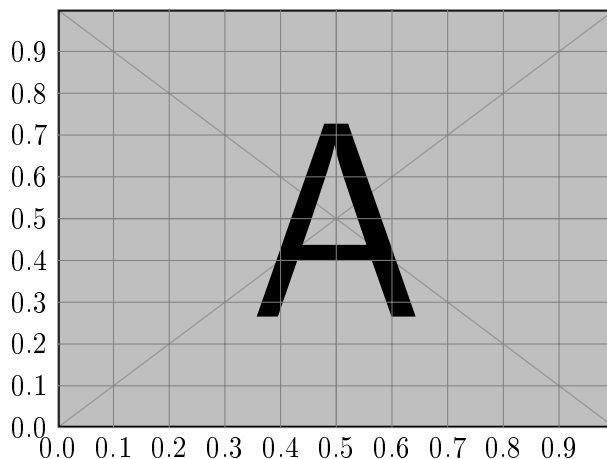
```
\usepackage[globaleexternalization=true|false]{stmtikzexternalization}
```

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

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 % - Premble:
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 Composite Structures and Adaptive Systems
18 %
19 %               __/|__
20 %               /_/_/_/_/
21 %               www.dlr.de/fa/en    || DLR
22 %
23 % Copyright (C) 2019-... DLR Composite Structures and
24 %               Adaptive Systems
25 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26 % Content %
27 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX
30 %   version 2e.
31 \NeedsTeXFormat{LaTeX2e}
32
33 % Provide the name of your page, the date it was last updated
34 %   , and a comment about what it's used for
35 \ProvidesPackage{stmtikz}[2019/10/27 STMs custom LaTeX tikz
36 %   definitions]
```

```

37 % -----
38
39 \@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
40 \@ifpackageloaded{kvoptions}{}{\RequirePackage{kvoptions}}%
41
42 % -----
43 % Options
44 % -----
45
46 \SetupKeyvalOptions{%
47   family=stmtikz,%
48   prefix=stmtikz@,%
49   setkeys=\kvsetkeys,%
50 }
51
52 % Libraries
53 \DeclareBoolOption[true]{libraries}
54
55 % Styles
56 \DeclareBoolOption[true]{styles}
57
58 % Externalization
59 \DeclareBoolOption[true]{externalization}
60
61 % Global externalization
62 \DeclareBoolOption[false]{globalexternalization}
63
64 % Output folder
65 \DeclareStringOption[ZZZ_TikZ]{externalizationoutputfolder}
66
67 % Process options
68 \ProcessKeyvalOptions{stmtikz}
69
70 % -----
71 % Modules
72 % -----
73
74 % Libraries
75 \ifstmtikz@libraries
76   \RequirePackage{stmtikzlibraries}
77 \fi
78
79 % Styles
80 \ifstmtikz@styles

```

```

81 \RequirePackage{stmtikzstyles}
82 \fi
83
84 % Externalization
85 \ifstmtikz@externalization
86 \@@ifpackageloaded{stmtikzexternalization}{}{
87 \RequirePackage[%
88 outputfolder=\stmtikz@externalizationoutputfolder,
89 global={\ifstmtikz@globalexternalization true\else
false\fi}
90 ]{stmtikzexternalization}
91 }
92 \fi
93
94 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
95 % That's it %
96 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
97
98 % Finally, we'll use \endinput to indicate that LaTeX can
stop reading this file. LaTeX will ignore anything after
this line.
99 \endinput

```


A.2. 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 % - Premble:
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 Composite Structures and Adaptive Systems
18 %
19 %               --/|--
20 %               /_/_/_/_/
21 %               www.dlr.de/fa/en   // DLR
22 %
23 % Copyright (C) 2019-... DLR Composite Structures and
24 %               Adaptive Systems
25 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26 % Content %
27 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX
30 %   version 2e.
31 \NeedsTeXFormat{LaTeX2e}
32
33 % Provide the name of your page, the date it was last updated
34 %   , and a comment about what it's used for
35 \ProvidesPackage{stmtikzlibraries}[2019/10/27 STMs custom
36 %   LaTeX tikz library definitions]
37 % -----
38 % Package
39 % -----
```

```

39 \@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
40
41 % -----
42 % Libraries
43 % -----
44
45 \usetikzlibrary{arrows.meta}
46 \usetikzlibrary{backgrounds}
47 \usetikzlibrary{calc}
48 \usetikzlibrary{decorations.markings}
49 \usetikzlibrary{decorations.text}
50 \usetikzlibrary{fit}
51 \usetikzlibrary{intersections}
52 \usetikzlibrary{tikzmark}
53 \usetikzlibrary{trees}
54 \usetikzlibrary{matrix}
55 \usetikzlibrary{mindmap}
56 \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.3. 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 Composite Structures and Adaptive Systems
18 %
19 %               --/|--
20 %               /_/_/_/_/
21 %               www.dlr.de/fa/en      // DLR
22 %
23 % Copyright (C) 2019-... DLR Composite Structures and
24 %               Adaptive Systems
25 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26 % Content %
27 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX
30 %   version 2e.
31 \NeedsTeXFormat{LaTeX2e}
32
33 % Provide the name of your page, the date it was last updated
34 %   , and a comment about what it's used for
35 \ProvidesPackage{stmtikzstyles}[2019/10/27 STMs custom LaTeX
36 %   tikz style definitions]
37
38 % -----
39 % Package
40 % -----
```

```

39 \@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
40 \@ifpackageloaded{stmcolors}{}{\RequirePackage{stmcolors}}%
41
42 % -----
43 % Pgfkeys
44 % -----
45
46 % From the pgf manual 2.10csh page 694:
47 %
48 % It should be noted that all calculations must not
49 % exceed +-16383.99999 at any point, because the underlying
50 % computations rely on TeX dimensions. This means that many
51 % of the underlying computations are necessarily approximate
52 % and that in addition, are not very fast. TeX is, after
53 % all, a typesetting language and not ideally suited to
54 % relatively advanced mathematical operations. However, it
55 % is possible to change the computations as described in
56 % Section 76.
57 %
58 % From the TeX Book page 114:
59 %
60 % 16383.99998pt (TeX's largest dimen)
61 %
62 % In Notes On Programming in TeX Chirstian Feuersaenger
63 % pointed out
64 %
65 % The \dimen registers perform their arithmetic's
66 % internally with 32 bit scaled integers, so called scaled
67 % point with unit sp. It holds 1pt = 65536sp = 216sp. One of
68 % the 32 bits is used as sign. The total number range in pt
69 % is  $[-(2^{30}-1)/2^{16}, (2^{30}-1)/2^{16}] = [-16383.9998,$ 
70 %  $+16383.9998]1$ .
71 %
72 % 1 Please note that this does not cover the complete
73 % range of a 32 bit integer, I do not know why
74 % \pgfkeys{/pgf/fpu=true} % Allow pgf
75 % to plot values larger than 16383.9998
76 % \tikzset{fpu} % Allow pgf
77 % to plot values larger than 16383.9998
78
79 \pgfkeys{/tikz/savenumber/.code 2 args={\global\edef#1{#2}}}
80
81 % -----
82 % 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
74       /10,0) {0.\x};}%
75     \foreach \y in {0,1,...,9} {\node [anchor=east] at (0,\y
76       /10) {0.\y};}%
77   }%
78 }
79
80 % Default arrow tip
81 \tikzset{
82   stmdefaultarrow/.style={
83     arrow style
84     >=Stealth,
85     % Define
86     % >=latex
87   }
88 }
89
90 % A cross for markings in plots
91 % https://tex.stackexchange.com/a/124064
92 \tikzset{%
93   cross/.style={%
94     cross out,%
95     draw,%
96     minimum size=2*(#1-\pgflinewidth),%
97     inner sep=0pt,%
98     outer sep=0pt,%
99   }%
100 }%
101
102 % Beamer overlay feature
103 % https://tex.stackexchange.com/a/146991/44634
104 \tikzset{%
105   invisible/.style={%
106     opacity=0,%
107     text opacity=0%
108   },%
109   visible on/.style={%
110     alt={%
111       #1{}{invisible}%
112     }
113   }
114 }

```

```

107     }%
108 },%
109 alt/.code args={<#1>#2#3}{%
110     \alt<#1>{\pgfkeysalso{#2}}{\pgfkeysalso{#3}} % \
111     pgfkeysalso doesn't 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
124         corners
125         draw=stmmarkupcolor,%
126         thick,%
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=\
133     pgfutil@empty},
134     stmmark/.style 2 args={decoration={markings,
135     mark= between positions 0 and 1 step (1/11)*\
136     pgfdecoratedpathlength with{%
137         \tikzset{#2,every mark}\tikz@options
138         \pgfuseplotmark{#1}%
139     },
140     postaction={decorate},
141     /pgfplots/legend image post style={
142         mark=#1,
143         #2,
144         every path/.append style={nomorepostactions}
145     },
146 }

```

```

147
148 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
149 % That's it %
150 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
151
152 % Finally, we'll use \endinput to indicate that LaTeX can
      stop reading this file. LaTeX will ignore anything after
      this line.
153 \endinput

```


A.4. 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 Composite Structures and Adaptive Systems
19 %
20 %               __/|__
21 %               /_/_/_/_
22 %               www.dlr.de/fa/en      |/_ DLR
23 %
24 % Copyright (C) 2019-... DLR Composite Structures and
25 %               Adaptive Systems
26 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
27 % Content %
28 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
29
30 % Declare that this style file requires at least LaTeX
31 %   version 2e.
32 \NeedsTeXFormat{LaTeX2e}
33
34 % Provide the name of your page, the date it was last updated
35 %   , and a comment about what it's used for
36 \ProvidesPackage{stmtikzexternalization}[2019/10/27 STMs
37 %   custom LaTeX tikz externalization definitions]
38
39 % -----
40 % Package
41 % -----

```

```

39
40 \@ifpackageloaded{tikz}{\RequirePackage{tikz}}%
41 \@ifpackageloaded{kvoptions}{\RequirePackage{kvoptions}}%
42
43 % -----
44 % Options
45 % -----
46
47 \SetupKeyvalOptions{%
48   family=stmtikzexternalization,%
49   prefix=stmtikzexternalization@,%
50   setkeys=\kvsetkeys,%
51 }
52
53 % Externalization
54 \DeclareBoolOption[false]{global}
55
56 % Output folder
57 \DeclareStringOption[ZZZ_TikZ]{outputfolder}
58
59 % Process options
60 \ProcessKeyvalOptions{stmtikzexternalization}
61
62 % -----
63 % Libraries
64 % -----
65
66 \usetikzlibrary{external}
67
68 % -----
69 % Settings
70 % -----
71
72 \tikzexternalize[%
73   mode=convert with system call,%
74   shell escape=-enable-write18,% % Use for MiKTeX
75 ]
76
77 % Output folder
78 \tikzsetexternalprefix{\stmtikzexternalization@outputfolder/}
79
80 % Set
81 \tikzset{%
82   external/system call={%

```

```

83     pdflatex \tikzexternalcheckshellescape -halt-on-error %
84     -interaction=batchmode -jobname "\image" "\texsource" %%%
85     %
86     %convert -density 600 -transparent white "\image.pdf" "\
87     image.png" % for ImageMagick versions <7
88     %magick -density 600 -transparent white "\image.pdf" "\
89     image.png" % for ImageMagick versions >= 7
90 }
91 }
92 % By default, do not allow global externalization
93 \ifstmtikzexternalization@global
94     \tikzexternalenable
95 \else
96     \tikzexternaldisable
97 \fi
98 %
99 % That's it
100 %
101 % Finally, we'll use \endinput to indicate that LaTeX can
102 % stop reading this file. LaTeX will ignore anything after
    this line.
\endinput

```