stmtikz package description

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v20191205

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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. 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 subsubsection 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 `tikzpicture`s.

`\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 `tikzpicture`s 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 *globalexternalization* This is a boolean option. Expected values are either `true` or `false`.

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

It is possible to control this behavior with

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

`globalexternalization=false` is the default. It is used in case `globalexternalization=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 `tikzpicture`s.

1.3. `stmtikzstyles`

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

1.4. `stmtikzexternalization`

1.4.1. Description

This package enables the externalization of `tikzpicture`s.

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 `tikzpicture`s. 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 *globalexternalization*   This is a boolean option. Expected values are either `true` or `false`.

    By default externalization is not enabled for `tikzpicture`s 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
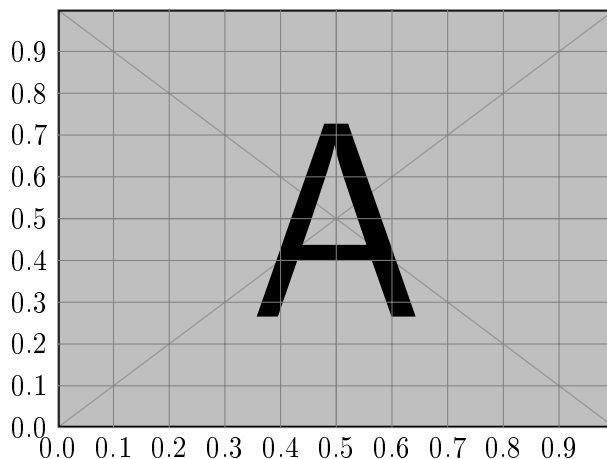
`\usepackage[globalexternalization=true|false]{stmtikzexternalization}`

    `globalexternalization=false` is the default. It is used in case `globalexternalization=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  %  - 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
24  %
25  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26  % Content                          %
27  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29  % Declare that this style file requires at least LaTeX
30     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{stmtikz}[2019/10/27 STMs custom LaTeX tikz
       definitions]
34
35  % ---------------------------
36  % Package
```

```
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  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
27  % Content                          %
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
    % -------------------------
```

```latex
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  %  - Premble:
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.
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}[2019/10/27 STMs custom LaTeX
        tikz style definitions]
34
35  % -------------------------
36  % Package
37  % -------------------------
38
```

12

```
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 change the path
111      },
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 with{%
135            \tikzset{#2,every mark}\tikz@options
136            \pgfuseplotmark{#1}%
137          },
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 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  %   - Premble:
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
25  %
26  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
27  % Content                           %
28  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
29
30  % Declare that this style file requires at least LaTeX
31      version 2e.
31  \NeedsTeXFormat{LaTeX2e}
32
33  % Provide the name of your page, the date it was last updated
33      , and a comment about what it's used for
34  \ProvidesPackage{stmtikzexternalization}[2019/10/27 STMs
34      custom LaTeX tikz externalization definitions]
35
36  % --------------------------
37  % Package
38  % --------------------------
```

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