stmtikz package description

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v 20191103

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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 LATEXor 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`.
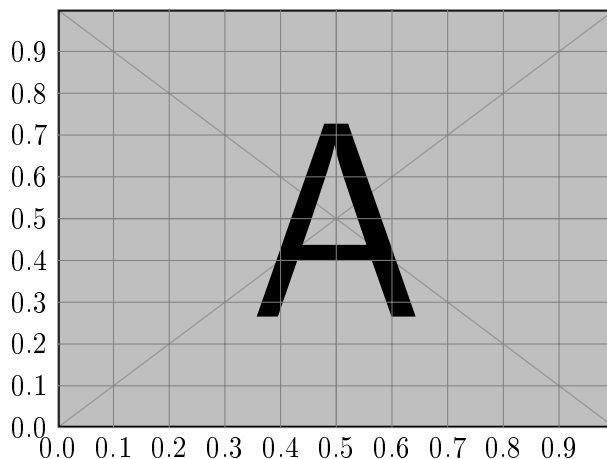
3. Known issues

`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

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Header                           %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% This is a interface to all stm tikz definitions
% Based upon the tikz package:
%   https://ctan.org/pkg/tikz
%
% Usage
%   - Premble:
%     - \usepackage{stmtikz}
%
% Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
%                       Initial draft
%
% Contact:    Martin Raedel,  martin.raedel@dlr.de
%             DLR Composite Structures and Adaptive Systems
%
%                                     __/|__
%                                    /_/_/_/
%             www.dlr.de/fa/en       |/ DLR
%
% Copyright (C) 2019-... DLR Composite Structures and
%   Adaptive Systems
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Content                          %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Declare that this style file requires at least LaTeX
%   version 2e.
\NeedsTeXFormat{LaTeX2e}

% Provide the name of your page, the date it was last updated
%   , and a comment about what it's used for
\ProvidesPackage{stmtikz}[2019/10/27 STMs custom LaTeX tikz
   definitions]

% ---------------------------
% Package
```

```
% --------------------------

\@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
\@ifpackageloaded{kvoptions}{}{\RequirePackage{kvoptions}}%

% --------------------------
% Options
% --------------------------

\SetupKeyvalOptions{%
  family=stmtikz,%
  prefix=stmtikz@,%
  setkeys=\kvsetkeys,%
}

% Libraries
\DeclareBoolOption[true]{libraries}

% Styles
\DeclareBoolOption[true]{styles}

% Externalization
\DeclareBoolOption[true]{externalization}

% Global externalization
\DeclareBoolOption[false]{globalexternalization}

% Output folder
\DeclareStringOption[ZZZ_TikZ]{externalizationoutputfolder}

% Process options
\ProcessKeyvalOptions{stmtikz}

% --------------------------
% Modules
% --------------------------

% Libraries
\ifstmtikz@libraries
  \RequirePackage{stmtikzlibraries}
\fi

% Styles
\ifstmtikz@styles
```

```
    \RequirePackage{stmtikzstyles}
\fi

% Externalization
\ifstmtikz@externalization
  \@ifpackageloaded{stmtikzexternalization}{}{
    \RequirePackage[%
      outputfolder=\stmtikz@externalizationoutputfolder,
      global={\ifstmtikz@globalexternalization true\else
        false\fi}
    ]{stmtikzexternalization}
  }
\fi

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% That's it                      %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Finally, we'll use \endinput to indicate that LaTeX can
  stop reading this file. LaTeX will ignore anything after
  this line.
\endinput
```

A.2. stmtikzlibraries.sty

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Header                              %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% This file includes unit definitions.
% Based upon the tikz package:
%   https://ctan.org/pkg/tikz
%
% Usage
%  - Premble:
%    - \usepackage{stmtikzlibraries}
%
% Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
%                       Initial draft
%
% Contact:    Martin Raedel,  martin.raedel@dlr.de
%             DLR Composite Structures and Adaptive Systems
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%             www.dlr.de/fa/en      |/ DLR
%
% Copyright (C) 2019-... DLR Composite Structures and
%   Adaptive Systems
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Content                             %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Declare that this style file requires at least LaTeX
%   version 2e.
\NeedsTeXFormat{LaTeX2e}

% Provide the name of your page, the date it was last updated
%   , and a comment about what it's used for
\ProvidesPackage{stmtikzlibraries}[2019/10/27 STMs custom
  LaTeX tikz library definitions]

% --------------------------
% Package
% --------------------------
```

```
\@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%

% --------------------------
% Libraries
% --------------------------

\usetikzlibrary{arrows.meta}
\usetikzlibrary{backgrounds}
\usetikzlibrary{calc}
\usetikzlibrary{decorations.markings}
\usetikzlibrary{decorations.text}
\usetikzlibrary{fit}
\usetikzlibrary{intersections}
\usetikzlibrary{tikzmark}
\usetikzlibrary{trees}
\usetikzlibrary{matrix}
\usetikzlibrary{mindmap}
\usetikzlibrary{patterns}
\usetikzlibrary{positioning}
\usetikzlibrary{shadows}
\usetikzlibrary{shadows.blur}
\usetikzlibrary{shapes}
\usetikzlibrary{shapes.misc}
\usetikzlibrary{spy}

% --------------------------
% Pgfmath
% --------------------------

% Stuff for calc compatiability.
\let\real=\pgfmath@calc@real
\let\minof=\pgfmath@calc@minof
\let\maxof=\pgfmath@calc@maxof
\let\ratio=\pgfmath@calc@ratio
\let\widthof=\pgfmath@calc@widthof
\let\heightof=\pgfmath@calc@heightof
\let\depthof=\pgfmath@calc@depthof

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% That's it                       %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Finally, we'll use \endinput to indicate that LaTeX can
    stop reading this file. LaTeX will ignore anything after
```

```
    this line.
\endinput
```

A.3. stmtikzstyles.sty

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Header                          %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% This is a interface to all stm tikz definitions
% Based upon the tikz package:
%   https://ctan.org/pkg/tikz
%
% Usage
%  - Premble:
%    - \usepackage{stmtikzstyles}
%
% Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
%                       Initial draft
%
% Contact:   Martin Raedel,  martin.raedel@dlr.de
%            DLR Composite Structures and Adaptive Systems
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%            www.dlr.de/fa/en       |/ DLR
%
% Copyright (C) 2019-... DLR Composite Structures and
%   Adaptive Systems
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Content                         %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Declare that this style file requires at least LaTeX
%   version 2e.
\NeedsTeXFormat{LaTeX2e}

% Provide the name of your page, the date it was last updated
%   , and a comment about what it's used for
\ProvidesPackage{stmtikzstyles}[2019/10/27 STMs custom LaTeX
   tikz style definitions]

% -------------------------
% Package
% -------------------------
```

```latex
\@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
\@ifpackageloaded{stmcolors}{}{\RequirePackage{stmcolors}}%

% ---------------------------
% Pgfkeys
% ---------------------------

% From the pgf manual 2.10csv page 694:
%
%     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.
%
% From the TeX Book page 114:
%
%     16383.99998pt (TeX's largest dimen)
%
% In Notes On Programming in TeX Chirstian Feuersaenger
%   pointed out
%
%     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.
%
%     1 Please note that this does not cover the complete
%   range of a 32 bit integer, I do not know why
% \pgfkeys{/pgf/fpu=true}                      % Allow pgf
%   to plot values larger than 16383.9998
% \tikzset{fpu}                                % Allow pgf
%    to plot values larger than 16383.9998

\pgfkeys{/tikz/savenumber/.code 2 args={\global\edef#1{#2}}}

% ---------------------------
% Styles
```

```
% -------------------------

% Help grid for external images
% Call inside scope with: \pic{stmimagegrid};
\tikzset{%
  stmimagegrid/.pic={%
   \draw[help lines,xstep=.1,ystep=.1] (0,0) grid (1,1);%
   \foreach \x in {0,1,...,9} {\node [anchor=north] at (\x
      /10,0) {0.\x};}%
   \foreach \y in {0,1,...,9} {\node [anchor=east]  at (0,\y
      /10) {0.\y};}%
  }%
}

% Default arrow tip
\tikzset{
  stmdefaultarrow/.style={                                 % Define
      arrow style
    >=Stealth,                                             % >=latex
  }
}

% A cross for markings in plots
% https://tex.stackexchange.com/a/124064
\tikzset{%
  cross/.style={%
    cross out,%
    draw,%
    minimum size=2*(#1-\pgflinewidth),%
    inner sep=0pt,%
    outer sep=0pt,%
  }%
}%

% Beamer overlay feature
% https://tex.stackexchange.com/a/146991/44634
\tikzset{%
  invisible/.style={%
    opacity=0,%
    text opacity=0%
  },%
  visible on/.style={%
    alt={%
      #1{}{invisible}%
```

```
    }%
  },%
  alt/.code args={<#1>#2#3}{%
    \alt<#1>{\pgfkeysalso{#2}}{\pgfkeysalso{#3}} % \
        pgfkeysalso doesn't change the path
  },
}

\tikzset{%
  stmmarkuptext/.style={%
    text=stmmarkupcolor,%
  }%
}

% Markup style for rectangles on external figures
\tikzset{%
  stmrectangularmarkup/.style={%
   inner sep=0pt,% necessary for correct positioning of
        corners
   draw=stmmarkupcolor,%
   thick,%
  }%
}

% Equal space decoration markers along addplot path
% http://tex.stackexchange.com/a/232010/44634
\tikzset{
  nomorepostactions/.code={\let\tikz@postactions=\
      pgfutil@empty},
  stmmark/.style 2 args={decoration={markings,
    mark= between positions 0 and 1 step (1/11)*\
        pgfdecoratedpathlength with{%
          \tikzset{#2,every mark}\tikz@options
          \pgfuseplotmark{#1}%
      },
    },
    postaction={decorate},
    /pgfplots/legend image post style={
      mark=#1,
      #2,
      every path/.append style={nomorepostactions}
    },
  },
}
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% That's it                       %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Finally, we'll use \endinput to indicate that LaTeX can
    stop reading this file. LaTeX will ignore anything after
    this line.
\endinput
```

A.4. stmtikzexternalization.sty

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Header                              %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% This is a interface to tikz externalization definitions.
% All TikZ output is written to 'ZZZ_TikZ' folder.
% Based upon the tikz package:
%   https://ctan.org/pkg/tikz
%
% Usage
%  - Premble:
%    - \usepackage{stmtikzexternalization}
%
% Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
%                       Initial draft
%
% Contact:    Martin Raedel,  martin.raedel@dlr.de
%             DLR Composite Structures and Adaptive Systems
%
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%                                     /_/_/_/
%             www.dlr.de/fa/en        |/ DLR
%
% Copyright (C) 2019-... DLR Composite Structures and
%   Adaptive Systems
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Content                             %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Declare that this style file requires at least LaTeX
%   version 2e.
\NeedsTeXFormat{LaTeX2e}

% Provide the name of your page, the date it was last updated
%   , and a comment about what it's used for
\ProvidesPackage{stmtikzexternalization}[2019/10/27 STMs
   custom LaTeX tikz externalization definitions]

% --------------------------
% Package
% --------------------------
```

17

```
\@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
\@ifpackageloaded{kvoptions}{}{\RequirePackage{kvoptions}}%

% --------------------------
% Options
% --------------------------

\SetupKeyvalOptions{%
  family=stmtikzexternalization,%
  prefix=stmtikzexternalization@,%
  setkeys=\kvsetkeys,%
}

% Externalization
\DeclareBoolOption[false]{global}

% Output folder
\DeclareStringOption[ZZZ_TikZ]{outputfolder}

% Process options
\ProcessKeyvalOptions{stmtikzexternalization}

% --------------------------
% Libraries
% --------------------------

\usetikzlibrary{external}

% --------------------------
% Settings
% --------------------------

\tikzexternalize[%
  mode=convert with system call,%
  shell escape=-enable-write18,%  % Use for MiKTeX
]

% Output folder
\tikzsetexternalprefix{\stmtikzexternalization@outputfolder/}

% Set
\tikzset{%
  external/system call={%
```

```
       pdflatex \tikzexternalcheckshellescape -halt-on-error %
       -interaction=batchmode -jobname "\image" "\texsource" %&&
           %
      %convert -density 600 -transparent white "\image.pdf" "\
          image.png" % for ImageMagick versions <7
      %magick  -density 600 -transparent white "\image.pdf" "\
          image.png" % for ImageMagick versions >= 7
  }
}


% By default, do not allow global externalization
\ifstmtikzexternalization@global
  \tikzexternalenable
\else
  \tikzexternaldisable
\fi

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% That's it                        %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Finally, we'll use \endinput to indicate that LaTeX can
   stop reading this file. LaTeX will ignore anything after
   this line.
\endinput
```