

Set up the TikZ in Emacs Org

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An introduction to setup the TikZ environment in Emacs Org File. So that in Org file, you can generate either vector graph of pdf format or raster graph of png format. Furthermore, you can export the vector graph when latex is called and otherwise raster graph.

1 config the header args

You can embed TiKz (One of \LaTeX graphic package) code into a Org file. With org-babel, you can generate ,insert and export the figure generated from Tikz package. At first, you need set up the environment. [This Post](#) serves as a good introduction for beginners. Following it you may have a minimum working example like below:

```
#+name: tutorial
#+header: :file "~/Dropbox/mstemc_hugo/static/img/tikz/tutorial.png"
#+header: :results raw :exports none :fit yes :border 0cm
#+header: :imagemagick t :imoptions -density 400
#+header: :imoutoptions -geometry 400 -flatten
#+header: :headers '("\usepackage{tikz} \usetikzlibrary{positioning,
    shapes.symbols, calc}")
#+begin_src latex
  \begin{tikzpicture}
    \node [circle, draw, fill=red!20] at (0,0) {1}
    child { node [circle, draw, fill=blue!30] {2}
      child { node [circle, draw, fill=green!30] {3} }
      child { node [circle, draw, fill=yellow!30] {4} }};
  \end{tikzpicture}
#+end_src
#+RESULTS: tutorial
[[file:../../img/tikz/tutorial.png]]
```

The example begins with several lines containing `#+header` which is sort of clutter. we can put them in a file and include it at the beginning of the Org file.

2 generate results with different formats

By changing the extension of `:file` (which is `pdf` for `"../../img/tikz/tutorial.pdf"`), we can generate results with different formats. Now, I need `pdf` and `png`. You can see the result by just press `C-c C-c` in the body of the `tikz` code.

3 export the results according to the backend

You can set `:exports` to control how the results will be exported. Now I set it as `none` which means the result will not be exported to latex or other format. I want to set more options of the exports. So I use:

```
#+ATTR_HTML: :width 800 :align center
#+ATTR_LATEX: :width 0.8\textwidth :align center
{{{if-latex(tutorial.pdf,tutorial.png)}}}
```

if-latex is a Org MACRO whose definition is :

```
#+MACRO: if-latex (eval (if
(org-export-derived-backend-p org-export-current-backend 'latex)
 (concat "[[file:../../img/tikz/" $1 "]]")
 (concat "[[file:../../img/tikz/" $2 "]]") ) )
```

The if-latex MACRO let you export different formats by the backend. If the backend is latex then, pdf format figure will be exported. Otherwise, png format figure. Eventually, in the final pdf document, you figure can be zoomed in or out without losing any resolution.

4 the final workflow

The minimum working example at the start of this post is simplified as below.

```
#+header: :file "../../img/tikz/tutorial.pdf"
#+begin_src latex
  \begin{tikzpicture}
    \node [circle, draw, fill=red!20] at (0,0) {1}
    child { node [circle, draw, fill=blue!30] {2}
      child { node [circle, draw, fill=green!30] {3} }
      child { node [circle, draw, fill=yellow!30] {4} }};
  \end{tikzpicture}
#+end_src

#+RESULTS:
[[file:../../img/tikz/tutorial.png]]
```

The following is the generated figure.

```
#+ATTR_HTML: :width 800 :align center
#+ATTR_LATEX: :width 0.8\textwidth :align center
{{{if-latex(tutorial.pdf,tutorial.png)}}}
```

Many settings are grouped into a setup file which is included at the top of this post:

```
#+SETUPFILE: ~/.spacemacs.d/org-templates/math-en.org
```

Now, If you set the extension of the target file in the first line either `pdf` or `png` , a corresponding `pdf` or `png` figure will be generated. If execute `M-x org-toggle-inline-images` , you can preview the result. If export the org-file as latex file then the `pdf` file, the image of `pdf` format will be inserted. If export to other format, `png` image will be used.