

Org-mode Latex Export Example

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May 6, 2018

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1 Org and L^AT_EX exporter configuration

- 1.1 Basic configuration
- 1.2 Misc configuration
- 1.3 Tables related configuration
- 1.4 Index configuration
- 1.5 Graphics
- 1.6 Other

2 Version information

- Emacs version

```
Emacs version: GNU Emacs 25.3.1 (x86_64-pc-linux-gnu, GTK+ Version 3.18.9)
  of 2017-12-30
org version: 9.1.9
```

- L^AT_EX version

```
pdfTeX 3.14159265-2.6-1.40.16 (TeX Live 2015/Debian)
kpathsea version 6.2.1
Copyright 2015 Peter Breitenlohner (eTeX)/Han The Thanh (pdfTeX).
There is NO warranty. Redistribution of this software is
covered by the terms of both the pdfTeX copyright and
the Lesser GNU General Public License.
For more information about these matters, see the file
named COPYING and the pdfTeX source.
Primary author of pdfTeX: Peter Breitenlohner (eTeX)/Han The Thanh (pdfTeX).
Compiled with libpng 1.6.17; using libpng 1.6.17
Compiled with zlib 1.2.8; using zlib 1.2.8
Compiled with poppler version 0.41.0
```

3 Debugging

- Org removes some of the intermediate files if the variable `org-latex-remove-logfiles` is set to true. So, for debugging, it makes sense to set it to nil.
- Use `pdflatex` with the option `synctex=1`. This option creates `*.synctex.gz` files which can be used by a viewer to jump to the respective text in the Tex file upon mouse clicking within the PDF. This is very useful to check the resulting L^AT_EX code when doing tests. Here is my own setting of the `org-latex-pdf-process` emacs configuration variable.

```
(setq org-latex-pdf-process
  (let
    ((cmd (concat "pdflatex -shell-escape -interaction nonstopmode"
      " --synctex=1"
      " -output-directory %o %f"))))
  (list cmd
    "cd %o; if test -r %b.idx; then makeindex %b.idx; fi"
    "cd %o; bibtex %b"
    cmd
    cmd)))
```

4 Major document elements

4.1 Equations

- Nice link for mathematical symbols [on wikipedia](#):

This is an example for an equation

$$cores_{extrapol} = cores_{intern2013} \cdot of fl\% \cdot \frac{gf \cdot (volume_{user} + volume_{intern})}{volume_{intern}}$$

This is an example for an equation embedded in the text $cores_{extrapol} = cores_{intern2013} \cdot of fl\% \cdot \frac{gf \cdot (volume_{user} + volume_{intern})}{volume_{intern}}$ The text continues after the formula.

Here follows a numbered equation that also can be referenced like in the following parentheses (eq 1). Note that we have to rely here on standard latex syntax, since org mode does not offer equations as a native element that we can mark up with `#+NAME` tags, etc.

$$cores_{extrapol} = cores_{intern2013} \cdot of fl\% \cdot \frac{gf \cdot (volume_{user} + volume_{intern})}{volume_{intern}} \quad (1)$$

from an [article by Stefaan Lippens](#) on on using *textnormal* for including normal text correctly in a math environment.

$$\int_1^9 x dx \quad \text{this is textrm}$$

$$\sum_1^9 y \quad \text{this is textsf}$$

$$\prod_1^9 z \quad \text{this is textnormal}$$

Only textnormal will guarantee that the text appears in the default font of the document.

4.2 Figures

I can reference the figure like this: Fig. 1.

Note

- there must be no empty line between the picture's link and the meta definitions for name, caption, etc.
- The figure must have a caption.
- The OPTION `tex:t` must be set for references to work.

| Specifier | Permission |
|-----------|---|
| h | Place the float here, i.e., approximately at the same point it occurs in the source text (however, not exactly at the spot) |
| t | Position at the top of the page. |
| b | Position at the bottom of the page. |
| p | Put on a special page for floats only. |
| \! | Override internal parameters \LaTeX uses for determining "good" float positions. |
| H | Places the float at precisely the location in the \LaTeX code. Requires the float package, e.g., <code>\usepackage{float}</code> . This is somewhat equivalent to h!. |

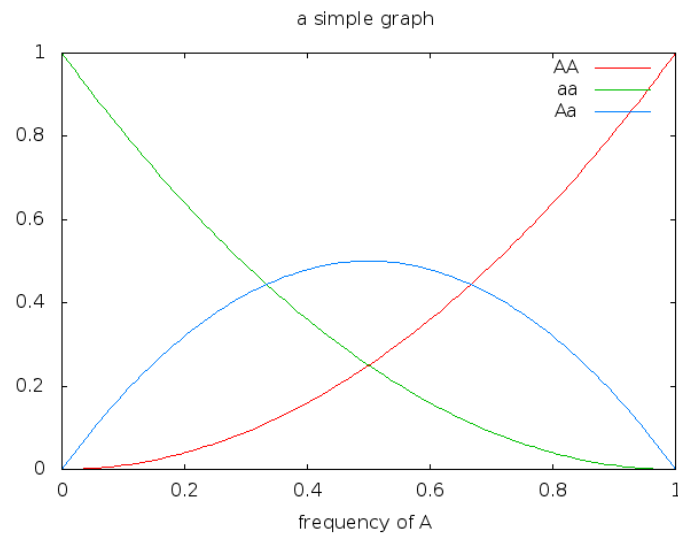


Figure 1: A simple graph

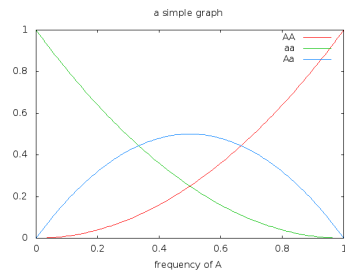


Figure 2: A simple graph at half the width

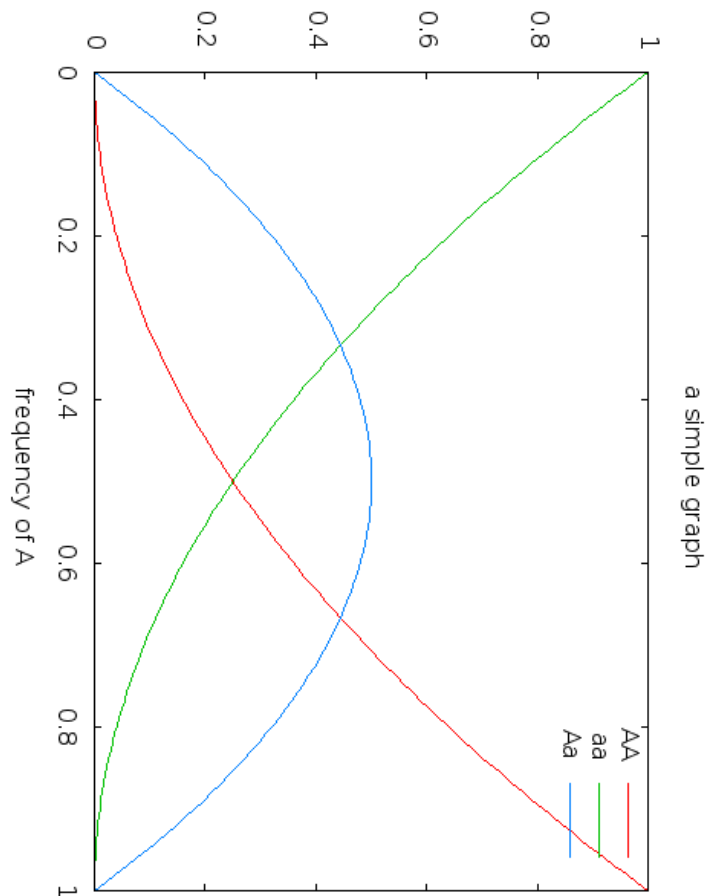


Figure 3: A simple graph rotated 270°

A pdf can be included the same way, e.g. by specifying

```
#+ATTR_LATEX: :options page=10 :width 10cm
[[file:myfig.pdf]]
```

4.2.1 inclusion of SVG graphics

q.v. my [my plantuml example documentation](#).

4.3 Tables

- Documentation
 - Very nice overview: <https://en.wikibooks.org/wiki/LaTeX/Tables>

4.3.1 nicer table formatting using booktab style

Some [interesting tips](#) for booktab style tables by M. Püschel.

Booktabs can be turned on by default for all tables by setting this variable for the document or globally:

```
org-latex-tables-booktabs: t
```

Whether table captions appear above or below the table can be configured using this variable setting:

```
org-latex-table-caption-above: nil
```

| Table 1: default table | | | |
|------------------------|----------|----------|----------|
| Column 1 | Column 2 | Column 3 | Column 4 |
| 1 | 10 | 100 | 1000 |
| 2 | 11 | 101 | 1001 |
| 3 | 12 | 102 | 1002 |
| 4 | 13 | 103 | 1003 |
| 5 | 14 | 104 | 1004 |
| 15 | 60 | 510 | 5010 |

| Table 2: table using booktabs style | | | |
|-------------------------------------|----------|----------|----------|
| Column 1 | Column 2 | Column 3 | Column 4 |
| 1 | 10 | 100 | 1000 |
| 2 | 11 | 101 | 1001 |
| 3 | 12 | 102 | 1002 |
| 4 | 13 | 103 | 1003 |
| 5 | 14 | 104 | 1004 |
| 15 | 60 | 510 | 5010 |

4.3.2 Math in tables

Use *math* or *inline math* together with *array* environment.

Here we use the simple math mode

$$\frac{Column1}{\sin(x)} \quad \frac{Column2}{\tan(x)}$$

This uses the `inline-math` mode $\frac{Column1}{\sin(x)} \quad \frac{Column2}{\tan(x)}$

4.3.3 Table font size

The font size is determined by the `:font` switch in the `#+ATTR_LATEX` line.

| Column 1 | Column 2 |
|-----------|-----------------|
| Some text | Some other text |
| 10 | 20 |

Sidenote:

- When a caption is used, the latex export uses a `table` environment.
- The previous captionless table generates a `tabular` environment.

Table 3: Table small size

| Column 1 | Column 2 |
|-----------|-----------------|
| Some text | Some other text |
| 10 | 20 |

Table 4: Table footnotesize

| Column 1 | Column 2 |
|-----------|-----------------|
| Some text | Some other text |
| 10 | 20 |

Table 5: Table scriptsize

| Column 1 | Column 2 |
|-----------|-----------------|
| Some text | Some other text |
| 10 | 20 |

Table 6: Table tiny size

| Column 1 | Column 2 |
|-----------|-----------------|
| Some text | Some other text |
| 10 | 20 |

4.3.4 Sidewaystable

Use the `float: sideways` ATTR option (The `float: sidewaysstable=` has been deprecated since Org 8.3, q.v. [info:org#Tables in L^AT_EX export](https://orgmode.org/doc/8.3/org-table.html#Tables%20in%20LaTeX%20export)) Using the `sidewaystable` together with a `:placement [H]` specifier requires that the `rotfloat` package is loaded.

| Table 7: A sidewaysstable | | | | | |
|---------------------------|----------|----------|----------|----------|----------|
| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
| 1 | 10 | 100 | 1000 | example | result |
| 2 | 11 | 101 | 1001 | example | result |
| 3 | 12 | 102 | 1002 | example | result |
| 4 | 13 | 103 | 1003 | example | result |
| 5 | 14 | 104 | 1004 | example | result |
| 6 | 15 | 105 | 1005 | example | result |
| 7 | 16 | 106 | 1006 | example | result |

This text comes after the `sidewaystable` (we want to check whether the placement modifier was observed).

Even though in the [info documentation it reads](#): "Note: `:placement` is ignored for `:float sideways tables.`", the modifier `[H]` is observed, as can be confirmed in the resulting `TEX` code.

4.3.5 Table over multiple pages with long text wrapped to cell width

Use the `longtabu` environment. This requires that you have loaded the `tabu` and `longtable` packages.

Table 8: A multi-page table with automatic text wrapping

| | |
|-----|---|
| 100 | Some extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 101 | Some other extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 102 | bla bla |
| 103 | repetition ahead |
| 100 | Some extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 101 | Some other extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 102 | bla bla |
| 103 | repetition ahead |
| 100 | Some extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 101 | Some other extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 102 | bla bla |
| 103 | repetition ahead |
| 100 | Some extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 101 | Some other extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 102 | bla bla |
| 103 | repetition ahead |
| 100 | Some extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 101 | Some other extremely long sentence which surely needs a linebreak if I add some additional words like these |
| 102 | bla bla |
| 103 | repetition ahead |
| 100 | Some extremely long sentence which surely needs a linebreak if I add some additional words like these |

101 Some other extremely long sentence which surely needs a linebreak if
I add some additional words like these

102 bla bla

103 repetition ahead

100 Some extremely long sentence which surely needs a linebreak if I add
some additional words like these

101 Some other extremely long sentence which surely needs a linebreak if
I add some additional words like these

102 bla bla

103 repetition ahead

100 Some extremely long sentence which surely needs a linebreak if I add
some additional words like these

101 Some other extremely long sentence which surely needs a linebreak if
I add some additional words like these

102 bla bla

100 Some extremely long sentence which surely needs a linebreak if I add
some additional words like these

98 Some other extremely long sentence which surely needs a linebreak if
I add some additional words like these

96 bla bla

94 repetition ahead

92 Some extremely long sentence which surely needs a linebreak if I add
some additional words like these

90 Some other extremely long sentence which surely needs a linebreak if
I add some additional words like these

88 bla bla

86 repetition ahead

84 Some extremely long sentence which surely needs a linebreak if I add
some additional words like these

82 Some other extremely long sentence which surely needs a linebreak if
I add some additional words like these

80 bla bla

78 repetition ahead

76 Some extremely long sentence which surely needs a linebreak if I add
some additional words like these

74 Some other extremely long sentence which surely needs a linebreak if
I add some additional words like these

72 bla bla

4.3.6 Tables with colored rows using `xcolors` and `colortbl`

A very nice reference for color in tables is provided by Xavier on the texblog.org:

<https://texblog.org/2018/01/15/color-table-series-part-2-xcolor-package/>

One can use the `\rowcolors` command to define coloring of alternating rows.
In front of the table use the following

`\rowcolors[2]{blue!10}{blue!25}`

The arguments translate to

- `[2]` start coloring in the second row
- `{blue!10}{blue!25}` definition of the two colors for odd and even rows according to the `xcolors` package

In order to prevent spillover of the `rowcolors` definition into later table, I wrap the whole table in `\begin{table}` and `\end{table}` definitions.

Table 9: A table with alternate line colors

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
|----------|----------|----------|----------|----------|----------|
| 1 | 10 | 100 | 1000 | example | result |
| 2 | 11 | 101 | 1001 | example | result |
| 3 | 12 | 102 | 1002 | example | result |
| 4 | 13 | 103 | 1003 | example | result |
| 5 | 14 | 104 | 1004 | example | result |
| 6 | 15 | 105 | 1005 | example | result |
| 7 | 16 | 106 | 1006 | example | result |

4.3.7 TODO Tables with colored rows using `tabu`

This needs the `tabu` and `xcolor` packages to be loaded. Use the `\LATEX` command `\taburowcolors` to define the colors right before the table.

`\taburowcolors[2]2{lightgray..white}`

The options in this command translate to

- `[2]` start coloring in 2nd row
- `2` : use 2 colors (so, if set to 2 then it is just alternating)
- `{lightgray..white}` defines the first and last color in the color range. This is a color series definition provided by the `xcolor` package.

Table 10: A table with alternate line colors

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
|----------|----------|----------|----------|----------|----------|
| 1 | 10 | 100 | 1000 | example | result |
| 2 | 11 | 101 | 1001 | example | result |
| 3 | 12 | 102 | 1002 | example | result |
| 4 | 13 | 103 | 1003 | example | result |
| 5 | 14 | 104 | 1004 | example | result |
| 6 | 15 | 105 | 1005 | example | result |
| 7 | 16 | 106 | 1006 | example | result |

`Booktabs` style does not mix well with this. The caption is too near to the table ruler, so here some work would need to be invested to get an aesthetically pleasing layout.

| Table 11: A table with alternate line colors | | | | | |
|--|----------|----------|----------|----------|----------|
| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
| 1 | 10 | 100 | 1000 | example | result |
| 2 | 11 | 101 | 1001 | example | result |
| 3 | 12 | 102 | 1002 | example | result |
| 4 | 13 | 103 | 1003 | example | result |
| 5 | 14 | 104 | 1004 | example | result |
| 6 | 15 | 105 | 1005 | example | result |
| 7 | 16 | 106 | 1006 | example | result |

Here, for comparison, a colored table produced by an inline \LaTeX fragment. Q.v. [this stackexchange discussion](#) to understand the color series.

Note: I need to do some more testing to get a better understanding of how the color ranges are defined. E.g. here in the 5th row there is suddenly a yellow color pouring in.

| | |
|------|---|
| Row1 | 1 |
| Row2 | 2 |
| Row3 | 3 |
| Row4 | 4 |
| Row5 | 5 |

| | |
|------|---|
| Row1 | 1 |
| Row2 | 2 |
| Row3 | 3 |
| Row4 | 4 |
| Row5 | 5 |

4.4 Source code

In order to get nice source code formatting and markup, one needs to add the **minted** package. I add here the relevant excerpt from my emacs initialization file (listing 1), which also serves as a first lisp code example

TODO: I was not yet able to figure out how to force org to place the source code listing exactly here in the text. While the documentation accepts a `:float t` attribute (and every source block with a caption automatically becomes a float), the placement modifier seems not to get translated

```
#+ATTR_LaTeX: :float t :placement [H]
```

I also add listing 2 as an example for C code markup:

```
(eval-after-load "ox-latex"
  '(progn
    ;; we want source code blocks to be syntax colored when exporting
    ;; via latex. We configure latex minted which uses python
    ;; pygments
    (add-to-list 'org-latex-packages-alist '(" " "minted"))
    (setq org-latex-listings 'minted)
    ;; define mappings of src-code-language to lexer that minted shall use
    ;;(add-to-list 'org-latex-listings-langs '(ipython "Python"))
    (add-to-list 'org-latex-minted-langs '(ipython "python"))))
```

Listing 1: emacs init.el snippet for including code markup by minted

```
#include "stdlib.h"
int main(int argc, char **argv) {
    printf("Hello World");
    exit(0);
}
```

Listing 2: C code markup example

5 Text features

5.1 Text font size

Text Example Huge Text Example huge
Text Example LARGE Text Example Large Text Ex-
ample large Text Example normalsize Text Example small Text Example footnote-
size Text Example scriptsize Text Example tiny

5.2 Footnotes and margin notes

Examples for footnotes: This is a text with a footnote ¹. The footnote will be displayed on the bottom of the current page. One can also place all footnotes in a separate chapter called *footnotes* at the end of the org file².

Footnotes definitions can be placed within an org section using the [fn:1] syntax and observing that no leading indentation is allowed on such a line. Alternatively the footnotes can be collected in a special section called "Footnotes". I recommend reading the respective INFO entry (e.g. there is also the possibility to define footnotes inline). When using C-c C-x f to insert footnotes a lot of the work is taken over by org itself (also allows footnote renumbering, etc.). One can jump between the footnote reference and its definition by the usual C-c C-o combination.

Margin notes can be inserted by directly inlining the L^AT_EX command as demonstrated in the source code for this section. By default the margin notes are justified. This often looks awkward. Using this [stackexchange answer](#), I

*a default
margin note*

¹This is the footnote text

²this is another footnote

define a macro which yields:

I like the margin notes to be left aligned instead of being justified.

*a left aligned
margin note
that looks
nicer*

5.3 References to sections, figures, tables, equations

Here, we show the usage of links to the text sections: Examples for References to figures are also found in chapter 4.2, to tables in chapter 4.3, and to equations in chapter 4.1.

Other references

- Figures can be referenced like this: Fig. 1.
- These are references to table 1 and table 2.
- And an example of an equation reference: eq 1. This reference requires latex syntax and a latex label as target. All the other links work based on org link syntax can use the name given to the elements via a leading `#+NAME:` line.

6 some interesting links

- Org \LaTeX exports
 - Subfigures in an org document for exporting to \LaTeX : gmmane.emacs.org/mode/92821
- Hyperlink formatting
 - described in the \LaTeX [hyperref](#) manual.
 - This is an example of how to get links that are not framed by red rectangles, but just have a blue font color

```
#+LaTeX_HEADER: \hypersetup{colorlinks=true, linkcolor=blue}
```
- Building a \LaTeX Document Class
 - <http://tutex.tug.org/pracjourn/2005-4/hefferon/hefferon.pdf>

7 Index creation

Must be solved by including \LaTeX source commands:

- Requires in the preamble
 - `\usepackage{makeidx}`
 - `\makeindex`
- Mark up words by `\index{word}`
- At the location where the index should appear, use `\printindex`
- to render the document, a call to the `makeindex` binary needs to be added in the build command. I use the following definition in my `init.el`.

```
(setq org-latex-pdf-process
  (let
    ((cmd (concat "pdflatex -shell-escape -interaction nonstopmode"
                  " -output-directory %o %f")))
    (list cmd
          "cd %o; if test -r %b.idx; then makeindex %b.idx; fi"
          cmd
          cmd)))
```

8 References

Some important org references that also display that citations directly following each other will be combined [3, 1]. And another single reference [2].

The `#+BIBLIOGRAPHY:` command inserts the reference list at the location where it is placed. It requires the name of the bib-file (without .bib extension) and the name of a style (e.g. plain).

For HTML exports one can also pass options to the `bibtex2html` binary (look at the comments section of `ox-bibtex.el` and also the `bibtex2html` man page).

Table 12: bibtex2html options

| option | functionality |
|--------|---|
| -d | sort by date |
| -a | sort as BibTeX (usually by author) default |
| -u | unsorted i.e. same order as in .bib file |
| -r | reverse the sort |
| -t | limit to entries cited in document |

Multiple options can be combined as follows:

option:-d option:-r

To get the citations correctly processed rendered, one needs to add a bibtex invocation to the \LaTeX command chain:

```
(setq org-latex-pdf-process
  (let
    ((cmd (concat "pdflatex -shell-escape -interaction nonstopmode"
                  " --synctex=1"
                  " -output-directory %o %f")))
    (list cmd
          "cd %o; if test -r %b.idx; then makeindex %b.idx; fi"
          "cd %o; bibtex %b"
          cmd
          cmd)))
```

To just produce a bibliography of all items in the bib file, one can use the following \LaTeX snippet. The `\nocite{*}` command includes an item that has not been cited in the document; a star matches all documents, so all get included (q.v. [this link](#)).


```

#+BEGIN_LATEX
\documentstyle{amsart}
\begin{document}
\nocite{*}
\bibliographystyle{amsplain}
\bibliography{bib-filename}
\end{document}
#+END_LATEX

```

References

- [1] DOMINIK, C. *The Org Mode 7 Reference Manual-Organize your life with GNU Emacs*. Network Theory Ltd., 2010.
- [2] FEICHTINGER, D., AND PLATTNER, D. A. Direct proof for $o = mn^V$ (salen) complexes. *Angewandte Chemie International Edition in English* 36, 16 (1997), 1718–1719.
- [3] SCHULTE, E., DAVISON, D., DYE, T., AND DOMINIK, C. A multi-language computing environment for literate programming and reproducible research. *Journal of Statistical Software* 46, 3 (2012), 1–24.

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Emacs 25.3.1 (Org mode 9.1.9)