

`smglom.cls/sty`: Semantic Multilingual Glossary for Math

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Abstract

The `smglom` package and class are part of the \LaTeX collection, a version of $\text{\TeX}/\text{\LaTeX}$ that allows to markup $\text{\TeX}/\text{\LaTeX}$ documents semantically without leaving the document format, essentially turning $\text{\TeX}/\text{\LaTeX}$ into a document format for mathematical knowledge management (MKM).

This package supplies an infrastructure for writing OMDoc glossary entries.

Contents

1	Introduction	2
2	The User Interface	2
2.1	Package and Class Options	2
2.2	Convenience Macros for SMGloM Modules	2
2.3	Terminological Relations	2
2.4	Presenting Glossaries	2
3	Implementation: The SMGloM Class	4
3.1	Class Options	4
3.2	Convenience Macros for SMGloM Modules	5
3.3	Terminological Relations	6
3.4	For Language Bindings	6
3.5	Authoring States, etc	7
3.6	Shadowing of repositories	7
3.7	Building Glossaries	7

1 Introduction

We use \LaTeX as the surface language for the SMGLoM (Semantic Multilingual Glossary of Mathematics), see [Gin+16; Koh14; SMG]. The `smglom` package and class provides some infrastructure to make this more convenient.

2 The User Interface

The `smglom` package provides convenience macros on top of the \LaTeX infrastructure to simplify writing SMGLoM glossary modules and make them more concise for reading. The `smglom` class just sets up the necessary \LaTeX packages and loads the `smglom` package.

2.1 Package and Class Options

`smglom.sty` accepts all options of the \LaTeX package and passes them along to `stex.sty` [Koh18]. `smglom.cls` also does that for the classes `omdoc.cls` [Kohlhase:smomdl] and `article.cls`.

2.2 Convenience Macros for SMGLoM Modules

The SMGLoM source files are more regular than arbitrary \LaTeX files. In particular,

- make heavy use of the `multiling` package for multilingual \LaTeX ,
- use the `mathhub` extensions to \LaTeX for file system organization,
- enforce the one-module-one-file convention and make sure that the module name must be the same as the (base name) of the file.

This allows use to abbreviate e.g.

```
\importmhmodule[mhrepos=lib/archive,path=current/modfile]{modname}
```

```
\gimport by\gimport[lib/archive]{modname} and analogously for \guse. 1
\guse
```

2.3 Terminological Relations

²

2.4 Presenting Glossaries

`smglossary` The `smglom` package provides the `smglossary` environment for presenting glossaries. This expects a sequence of

- `smentry` • glossary entries marked up using the `smentry` environment, which contains a definition.

`\smsynonymref` • synonym references marked up `\smsynonymref`

¹EdNOTE: document them

²EdNOTE: document them

`\smjointdefref` • joint definition references marked up `\smjointdefref`

The latter two mark up cross references for definitions that contain more than one `\defi*` and would otherwise result in multiple (often more than a handful) copies of the same definition and thus lead to rambling glossaries.

The following snippet is a typical example, showing all three cases.

```
\begin{smglossary}
  \smjointdefref{zero vector}{x6e12a4211dd6546c}{vector space}
  \begin{smentry}{\hypertarget{x4d4e8afd0e133715}{zerofree}}{smglom/numbers}
    \guse[smglom/numbers]{zerofree}
    An \trefi[integernumbers]{integer} whose decimal digits
    \trefi[positional-number-system]{digit} no zeros is said to be \defi{zerofree}.
  \end{smentry}
  \smsynonymref{well-ordering}{x1e9bbb88fb4d90b3}{well-order}
\end{smglossary}
```

The \TeX universe has a set of LMH scripts [] that allow to generate glossaries and dictionaries from \TeX sources, such as [SMG].

3 Implementation: The SMGloM Class

3.1 Class Options

To initialize the `smglom` class, we pass on all options to `omdoc.cls` as well as the `stex` and `smglom` packages.

```
1 <*cls>
2 \DeclareOption*{\PassOptionsToClass{\CurrentOption}{omdoc}}
3                               \PassOptionsToPackage{\CurrentOption}{stex}
4                               \PassOptionsToPackage{\CurrentOption}{smglom}}
5 \ProcessOptions
```

We load `omdoc.cls`, the `smglom` package that provides the SMGloM-specific functionality³, and the `stex` package to allow OMDoc compatibility.

```
6 \LoadClass{omdoc}
7 \RequirePackage{smglom}
8 \RequirePackage{stex}
9 \RequirePackage{amstext}
10 \RequirePackage{amsfonts}
11 </cls>
```

Now we do the same thing for the package; first the options, which we just pass on to the `stex` package. But we also make sure that the `modules` package is loaded with the `mh` option, since the `smglom` package depends on these extensions.

```
12 <*sty>
13 \PassOptionsToPackage{mh}{modules}
14 \DeclareOption*{\PassOptionsToPackage{\CurrentOption}{statements}
15                               \PassOptionsToPackage{\CurrentOption}{dcm}
16                               \PassOptionsToPackage{\CurrentOption}{cmath}
17                               \PassOptionsToPackage{\CurrentOption}{structview}
18                               \PassOptionsToPackage{\CurrentOption}{smultiling}}
19 \ProcessOptions
```

We load `omdoc.cls`, and the desired packages. For the \LaTeX ML bindings, we make sure the right packages are loaded.

```
20 \RequirePackage{statements}
21 \RequirePackage[langfiles]{smultiling}
22 \RequirePackage{structview}
23 \RequirePackage{dcm}
24 \RequirePackage{cmath}
25 \RequirePackage[base]{babel}
```

We set up triggers for the other languages, currently only German.

```
26 \AfterBabelLanguage{ngerman}{\input{smglom-ngerman.ldf}}
```

³EDNOTE: MK:describe that above

3.2 Convenience Macros for SMGloM Modules

`\gimport` Just a shortcut, we have a starred and unstarred version, the first one is conservative. For example, if we execute:

```
\gimport[smglom/numberfields]{naturalnumbers}
```

First we are redirected to `\@gimport@nostar`, we store the `smglom/numberfields` (*the repo's path*) in `\@test`, then store `\mh@currentrepos` (*current directory*) in `\mh@repos`. If no repo's path is offered, that means the module to import is under the same directory, so we let `mhrepos=\mh@repos` and pass bunch of parameters to `\importmhmodule`, which is defined in `module.sty`. If there's a repo's path, then we let `mhrepos=<the repo's path>`. Finally we use `\mhcurrentrepos` (defined in `module.sty`) to change the `\mh@currentrepos`.

```
27 \def\gimport{\@ifstar\@gimport@star\@gimport@nostar}%
28 \newrobustcmd\@gimport@star[2] [] {%
29   \def\@test{#1}%
30   \edef\mh@@repos{\mh@currentrepos}%
31   \ifx\@test\@empty%
32     \importmhmodule[conservative,mhrepos=\mh@@repos,ext=tex,path=#2]{#2}%
33   \else%
34     \importmhmodule[conservative,mhrepos=#1,ext=tex,path=#2]{#2}%
35   \fi%
36   \mhcurrentrepos{\mh@@repos}%
37   \ignorespacesandpars%
38 }%
39 \newrobustcmd\@gimport@nostar[2] [] {%
40   \def\@test{#1}%
41   \edef\mh@@repos{\mh@currentrepos}%
42   \ifx\@test\@empty%
43     \importmhmodule[mhrepos=\mh@@repos,ext=tex,path=#2]{#2}%
44   \else%
45     \importmhmodule[mhrepos=#1,ext=tex,path=#2]{#2}%
46   \fi%
47   \mhcurrentrepos{\mh@@repos}%
48   \ignorespacesandpars%
49 }%
```

`guse` just a shortcut

```
50 \newrobustcmd\guse[2] [] {\def\@test{#1}%
51   \edef\mh@@repos{\mh@currentrepos}%
52   \ifx\@test\@empty%
53     \usemhmodule[mhrepos=\mh@@repos,ext=tex,path=#2]{#2}%
54   \else%
55     \usemhmodule[mhrepos=#1,ext=tex,path=#2]{#2}%
56   \fi%
57   \mhcurrentrepos{\mh@@repos}%
58   \ignorespacesandpars%
```

59 }%

gstructure we essentially copy over the definition of **mhstructure**, but adapt it to the SM-GloM situation.

```
60 \newenvironment{gstructure}[3][\def\test{#1}%
61 \xdef\mh@@@repos{\mh@currentrepos}%
62 \ifx\@test\@empty%
63 \gdef\@@doit{\importmhmodule[mhrepos=\mh@@@repos,path=#3,ext=tex]{#3}}%
64 \else%
65 \gdef\@@doit{\importmhmodule[mhrepos=#1,path=#3,ext=tex]{#3}}%
66 \fi%
67 \ifmod@show\par\noindent structure import "#2" from module #3 \@@doit\fi%
68 \ignorespacesandpars}
69 {\aftergroup\@@doit\ifmod@show end import\fi%
70 \ignorespacesandparsafterend}
```

3.3 Terminological Relations

***nym**

```
71 \newrobustcmd\hypernym[3][\if@importing\else\par\noindent #2 is a hypernym of #3\fi}%
72 \newrobustcmd\hyponym[3][\if@importing\else\par\noindent #2 is a hyponym of #3\fi}%
73 \newrobustcmd\meronym[3][\if@importing\else\par\noindent #2 is a meronym of #3\fi}%

```

EdN:4

\MSC to define the Math Subject Classification, ⁴

```
74 \newrobustcmd\MSC[1]{\if@importing\else MSC: #1\fi\ignorespacesandpars}%

```

3.4 For Language Bindings

Here we adapt the **smultiling** functionality to the special situation, where the module and file names are identical by design.

gviewsig The **gviewsig** environment is just a layer over the **mhviewsig** environment with the keys suitably adapted.

```
75 \newenvironment{gviewsig}[4][\% keys, id, from, to
76 \def\test{#1}%
77 \ifx\@test\@empty%
78 \begin{mhviewsig}[frompath=#3,topath=#4]{#2}{#3}{#4}%
79 \else%
80 \begin{mhviewsig}[frompath=#3,topath=#4,#1]{#2}{#3}{#4}%
81 \fi%
82 \ignorespacesandpars%
83 }{\%
84 \end{mhviewsig}%
85 \ignorespacesandparsafterend%
86 }%
```

⁴EdNOTE: MK: what to do for the LaTeXML side?

`gviewnl` The `gviewnl` environment is just a layer over the `mhviewnl` environment with the keys suitably adapted.

```

87 \newenvironment{gviewnl}[5][{}]{% keys, id, lang, from, to
88   \def\@test{#1}\ifx\@test\@empty%
89     \begin{mhviewnl}[frompath=#4,topath=#5]{#2}{#3}{#4}{#5}%
90   \else%
91     \begin{mhviewnl}[frompath=#4,topath=#5,#1]{#2}{#3}{#4}{#5}%
92   \fi%
93 \ignorespacesandpars%
94 }{}%
95 \end{mhviewnl}%
96 \ignorespacesandparsafterend%
97 }%
```

EdN:5

```

\gincludeview 5
98 \newcommand\gincludeview[2][{}]{\ignorespacesandpars}%
```

3.5 Authoring States, etc

We add a key to the module environment.

```
99 \addmetakey{module}{state}%
```

3.6 Shadowing of repositories

`\repos@macro` `\repos@macro` parses a GitLab repository name $\langle group \rangle / \langle name \rangle$ and creates an internal macro name from that, which will be used

```
100 \def\repos@macro#1/#2;{#1@shadows@#2}%
```

`\shadow` `\shadow{\langle orig \rangle}{\langle fork \rangle}` declares a that the private repository $\langle fork \rangle$ shadows the MathHub repository $\langle orig \rangle$. Internally, it simply defines an internal macro with the shadowing information.

```
101 \def\shadow#1#2{\@namedef{\repos@macro#1;}{#2}}%
```

`\MathHubPath` `\MathHubPath{\langle repos \rangle}` computes the path of the fork that shadows the MathHub repository $\langle repos \rangle$ according to the current `\shadow` specification. The computed path can be used for loading modules from the private version of $\langle repos \rangle$.

```
102 \def\MathHubPath#1{\@ifundefined{\repos@macro#1;}{#1}{\@nameuse{\repos@macro#1;}}}%
```

3.7 Building Glossaries

`smentry`

```

103 \newenvironment{smentry}[2]%
104 {\item[\textbf{#1}]\mhcurrentrepos{#2}\begin{module}[id=foo]\begin{definition}[display=flow]}
105 {\end{definition}\end{module}}
```

⁵EDNOTE: This is fake for now, needs to be implemented and documented

```

smglossary
106 \newenvironment{smglossary}{\begin{itemize}}{\end{itemize}}

\smsynonymref
107 \newcommand\smglom@synonymref@kw{See}
108 \newcommand\smsynonymref[3]{\item[\textbf{#1}] \smglom@synonymref@kw\ \textcolor{blue}{\hyperlin

\smjointdefref
109 \newcommand\smglom@jointref@kw{Defined along with}
110 \newcommand\smjointdefref[3]{\item[\textbf{#1}] \smglom@jointref@kw\ \textcolor{blue}{\hyperlin
111 \</sty>

```


References

- [] *LMH Scripts*. GitHub repository at <https://github.com/sLaTeX/lmhtools>. accessed 15. 11. 2019. URL: <https://github.com/sLaTeX/lmhtools>.
- [Gin+16] Deyan Ginev et al. “The SMGloM Project and System. Towards a Terminology and Ontology for Mathematics”. In: *Mathematical Software - ICMS 2016 - 5th International Congress*. Ed. by Gert-Martin Greuel et al. Vol. 9725. LNCS. Springer, 2016. DOI: 10.1007/978-3-319-42432-3. URL: <http://kwarc.info/kohlhase/papers/icms16-smglom.pdf>.
- [Koh14] Michael Kohlhase. “A Data Model and Encoding for a Semantic, Multilingual Terminology of Mathematics”. In: *Intelligent Computer Mathematics*. Conferences on Intelligent Computer Mathematics (Coimbra, Portugal, July 7–11, 2014). Ed. by Stephan Watt et al. LNCS 8543. Springer, 2014, pp. 169–183. ISBN: 978-3-319-08433-6. URL: <http://kwarc.info/kohlhase/papers/cicm14-smglom.pdf>.
- [Koh18] Michael Kohlhase. *sTeX: Semantic Markup in T_EX/L^AT_EX*. Tech. rep. 2018. URL: <https://github.com/sLaTeX/sTeX/raw/master/sty/stex.pdf>.
- [SMG] *SMGloM: A Semantic Multilingual Glossary Resource for Mathematics*. URL: <http://gl.mathhub.info/smgloM> (visited on 07/10/2019).