

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

Michael Kohlhasse
FAU Erlangen-Nürnberg
<http://kwarc.info/kohlhasse>

November 12, 2019

Abstract

The `smglom` package and class are part of the \LaTeX collection, a version of \TeX / \LaTeX that allows to markup \TeX / \LaTeX documents semantically without leaving the document format, essentially turning \TeX / \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	Namespaces and Alignments	2
2.5	Presenting Glossaries	3
3	Implementation: The SMGloM Class	5
3.1	Class Options	5
3.2	Convenience Macros for SMGloM Modules	5
3.3	Terminological Relations	7
3.4	Namespaces and Alignments	7
3.5	For Language Bindings	7
3.6	Authoring States, etc	8
3.7	Shadowing of repositories	8
3.8	Building Glossaries	8

1 Introduction

We use $\text{\texttt{S}\TeX}$ 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 $\text{\texttt{S}\TeX}$ infrastructure to simplify writing SMGLoM glossary modules and make them more concise for reading. The `smglom` class just sets up the necessary $\text{\texttt{S}\TeX}$ packages and loads the `smglom` package.

2.1 Package and Class Options

`smglom.sty` accepts all options of the $\text{\texttt{S}\TeX}$ 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 $\text{\texttt{S}\TeX}$ files. In particular,

- make heavy use of the `smultiling` package for multilingual $\text{\texttt{S}\TeX}$,
- use the `mathhub` extensions to $\text{\texttt{S}\TeX}$ 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 Namespaces and Alignments

```
\symalign
```

³ In SMGLoM, we often want to align the content of glossary modules to formalizations, e.g. to take advantage of type declarations there. The `\symalign` macro takes two regular arguments: the first is the name symbol declared in the current module (e.g. by a `\syml`), and the second the URI name of a symbol in an external theory in the form $\langle theory \rangle ? \langle name \rangle$.

¹EDNOTE: document them

²EDNOTE: document them

³EDNOTE: MK: maybe this should go into some other module; it seems awfully foundational.

As full MMT URIs are of the form $\langle URI \rangle ? \langle theory \rangle ? \langle name \rangle$, we need a way to specify the $\langle URI \rangle$. We adopt the system of **namespaces** of in MMT: the `\namespace` macro declares a namespace URI. If the optional argument is given, then this is a namespace abbreviation declaration, which can be used later, for instance in `\symalign` that takes an optional first argument: the namespace of the external theory.

`\namespace`

The situation below is typical. We first declare the namespace abbreviation `sets` and then use the `\modalign` macro to specify that the external theory `sets:?ESet` is the default alignment target, i.e. any symbol that in the local `emptyset` module is aligned by default to the symbol with the same name in the external `sets:?ESet` theory.

`\modalign`

```
\begin{modsig}[creators=miko]{emptyset}
  \gimport{set}
  \namespace[sets]{http://mathhub.info/MitM/smgglom/sets}
  \modalign[sets]{ESet}

  \symdef{eset}{\emptyset}
  \symi{non-empty}
  \symalign{non-empty}{ESet?non_empty}
\end{modsig}
```

The default alignment breaks down for the symbol `non-empty`, so we specify an alignment to the symbol `Eset?non_empty` via `\symalign`.

2.5 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`

`\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}
\end{smglossary}
```

```

\end{smentry}
\smssynonymref{well-ordering}{x1e9bbb88fb4d90b3}{well-order}
\end{smglossary}

```

The \TeX universe has a set of LMH scripts [[URL:lmhtools:github](https://github.com/TeX-LMH)] 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 functionality⁴, 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.

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

We load `omdoc.cls`, and the desired packages. For the L^AT_EXML bindings, we make sure the right packages are loaded.

```
19 \RequirePackage{statements}
20 \RequirePackage[langfiles]{smultiling}
21 \RequirePackage{structview}
22 \RequirePackage{dcm}
23 \RequirePackage{cmath}
```

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}
```

⁴EdNOTE: MK:describe that above

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 `repos=\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 `repos=\@test`. Finally we use `\mhcurrentrepos` (defined in `module.sty`) to change the `\mh@currentrepos`.

```

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

```

guse just a shortcut

```

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

```

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

```

57 \newenvironment{gstructure}[3] [] {\def\@test{#1}%
58   \xdef\mh@@@repos{\mh@currentrepos}%
59   \ifx\@test\@empty%
60     \gdef\@doit{\importmhmodule[repos=\mh@@@repos, path=#3, ext=tex]{#3}}%

```

```

61 \else%
62 \gdef\@doit{\importmhmodule[repos=#1,path=#3,ext=tex]{#3}}%
63 \fi%
64 \ifmod@show\par\noindent structure import "#2" from module #3 \@doit\fi%
65 \ignorespacesandpars}
66 {\aftergroup\@doit\ifmod@show end import\fi%
67 \ignorespacesandparsafterend}

```

3.3 Terminological Relations

```

*nym
68 \newrobustcmd\hypernym[3] []{\if@importing\else\par\noindent #2 is a hypernym of #3\fi}%
69 \newrobustcmd\hyponym[3] []{\if@importing\else\par\noindent #2 is a hyponym of #3\fi}%
70 \newrobustcmd\meronym[3] []{\if@importing\else\par\noindent #2 is a meronym of #3\fi}%

```

EdN:5

```

\MSC to define the Math Subject Classification, 5
71 \newrobustcmd\MSC[1]{\if@importing\else MSC: #1\fi\ignorespacesandpars}%

```

3.4 Namespaces and Alignments

```

\namespace
72 \newcommand\namespace[2] []{\ignorespaces}

\modalign
73 \newcommand\modalign[2] []{\ignorespaces}

\symalign
74 \newcommand\symalign[3] []{\ignorespaces}

```

3.5 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}%

```

⁵EdNOTE: MK: what to do for the LaTeXML side?

```

85 \ignorespacesandparsafterend%
86 }%

```

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:6

```

\gincludeview 6
98 \newcommand\gincludeview[2][{}]{\ignorespacesandpars}%

```

3.6 Authoring States, etc

We add a key to the module environment.

```

99 \addmetakey{module}{state}%

```

3.7 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;}}}%

```

3.8 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}}

```

⁶EDNOTE: This is fake for now, needs to be implemented and documented


```

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

\smsynonymref
107 \newcommand\smsynonymref[3]{\item[\textbf{#1}] See \textcolor{blue}{\hyperlink{#2}{#3}}}

\smjointdefref
108 \newcommand\smjointdefref[3]{\item[\textbf{#1}] Defined along with \textcolor{blue}{\hyperlink{
109 \</sty>

```

References

- [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 Kohlase. “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 Kohlase. *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 Git Repository*. URL: <http://gl.mathhub.info/smgloM/smgloM> (visited on 07/10/2013).