

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

Michael Kohlhase  
FAU Erlangen-Nürnberg  
<http://kwarc.info/kohlhase>

August 19, 2019

## Abstract

The `smglom` package is part of the `sTeX` 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

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>The User Interface</b>	<b>2</b>
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
<b>3</b>	<b>Implementation: The SMGloM Class</b>	<b>4</b>
3.1	Class Options . . . . .	4
3.2	Convenience Macros for SMGloM Modules . . . . .	4
3.3	Terminological Relations . . . . .	6
3.4	Namespaces and Alignments . . . . .	6
3.5	For Language Bindings . . . . .	6
3.6	Authoring States, etc . . . . .	7
3.7	Shadowing of repositories . . . . .	7

# 1 Introduction

We use  $\text{\LaTeX}$  as the surface language for the SMGLoM (Semantic Multilingual Glossary of Mathematics), see [GinlanJuc:spsttom16; Koh14; ]. The `smglom` package and class provides some infrastructure to make this more convenient.

## 2 The User Interface

### 2.1 Package and Class Options

`smglom.sty` accepts all options of the  $\text{\LaTeX}$  package and passes them along to `stex.sty`. `smglom.cls` also does that for the classes `omdoc.cls` and `article.cls`.

### 2.2 Convenience Macros for SMGLoM Modules

The SMGLoM source files are more regular than arbitrary  $\text{\LaTeX}$  files. In particular,

- make heavy use of the `multiling` package for multilingual  $\text{\LaTeX}$ ,
- use the `mathhub` extensions to  $\text{\LaTeX}$  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

```
\importmhmodule[mhrepos=lib/archive,path=current/modfile]{modname}  
\gimport[lib/archive]{modname} and analogously for \guse.1  
\guse
```

### 2.3 Terminological Relations

<sup>2</sup>

### 2.4 Namespaces and Alignments

<sup>3</sup> 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 `\sympi`), and the second the URI name of a symbol in an external theory in the form  $\langle theory \rangle ? \langle name \rangle$ .

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 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.

```
\symalign
```

```
\namespace
```

---

<sup>1</sup>EDNOTE: document them

<sup>2</sup>EDNOTE: document them

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

The situation below is typical. We first declare the namespace abbreviation `\modalign 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.

```
\begin{modsig}[creators=miko]{emptyset}
  \gimport{set}
  \namespace[sets]{http://mathhub.info/MitM/smg1om/sets}
  \modalign[sets]{ESet}

  \symdef{eset}{\emptyset}
  \syml{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`.

## 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 functionality<sup>4</sup>, 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  $\text{\LaTeX}$ ML 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}
```

---

<sup>4</sup>EdNOTE: 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, <sup>5</sup>

```

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}%

```

---

<sup>5</sup>EdNOTE: 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;}}%
103 \</sty>

```

---

<sup>6</sup>EdNOTE: This is fake for now, needs to be implemented and documented

## References

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