

# `omdoc.sty/cls`: Semantic Markup for Open Mathematical Documents in $\text{\LaTeX}$

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## **Abstract**

The `omdoc` package is part of the  $\text{\LaTeX}$  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 documents in  $\text{\LaTeX}$ . This includes a simple structure sharing mechanism for  $\text{\LaTeX}$  that allows to move from a copy-and-paste document development model to a copy-and-reference model, which conserves space and simplifies document management. The augmented structure can be used by MKM systems for added-value services, either directly from the  $\text{\LaTeX}$  sources, or after translation.

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# 1 Introduction

$\mathcal{S}\mathcal{T}\mathcal{E}\mathcal{X}$  is a version of  $\mathcal{T}\mathcal{E}\mathcal{X}/\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$  that allows to markup  $\mathcal{T}\mathcal{E}\mathcal{X}/\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$  documents semantically without leaving the document format, essentially turning  $\mathcal{T}\mathcal{E}\mathcal{X}/\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$  into a document format for mathematical knowledge management (MKM). The package supports direct translation to the OMDoc format [Koh06]

The `omdoc` package supplies macros and environment that allow to label document fragments and to reference them later in the same document or in other documents. In essence, this enhances the document-as-trees model to documents-as-directed-acyclic-graphs (DAG) model. This structure can be used by MKM systems for added-value services, either directly from the  $\mathcal{S}\mathcal{T}\mathcal{E}\mathcal{X}$  sources, or after translation. Currently, trans-document referencing provided by this package can only be used in the  $\mathcal{S}\mathcal{T}\mathcal{E}\mathcal{X}$  collection.

DAG models of documents allow to replace the “Copy and Paste” in the source document with a label-and-reference model where document are shared in the document source and the formatter does the copying during document formatting/presentation.<sup>1</sup>

## 2 The User Interface

The `omdoc` package generates four files: `omdoc.cls`, `omdoc.sty` and their  $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}\mathcal{M}\mathcal{L}$  bindings `omdoc.cls.ltxml` and `omdoc.sty.ltxml`. We keep the corresponding code fragments together, since the documentation applies to both of them and to prevent them from getting out of sync. The OMDoc class is a minimally changed variant of the standard `article` class that includes the functionality provided by `omdoc.sty`. Most importantly, `omdoc.cls` sets up the  $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}\mathcal{M}\mathcal{L}$  infrastructure and thus should be used if OMDoc is to be generated from the  $\mathcal{S}\mathcal{T}\mathcal{E}\mathcal{X}$  sources. The rest of the documentation pertains to the functionality introduced by `omdoc.sty`.

### 2.1 Package and Class Options

The `omdoc` package and class accept the following options:

<code>report</code>	load <code>report.cls</code> instead of <code>article.cls</code>
<code>book</code>	load <code>book.cls</code> instead of <code>article.cls</code>
<code>showignores</code>	show the the contents of the <code>ignore</code> environment after all
<code>showmeta</code>	show the metadata; see <code>metakeys.sty</code>
<code>showmods</code>	show modules; see <code>modules.sty</code>
<code>extrefs</code>	allow external references; see <code>sref.sty</code>
<code>defindex</code>	index definienda; see <code>statements.sty</code>

---

<sup>1</sup>EDNOTE: integrate with `latexml`’s `XMRef` in the Math mode.

## 2.2 Document Structure

<b>document</b>	The top-level <b>document</b> environment is augmented with an optional key/value argument that can be used to give metadata about the document. For the moment
<b>id</b>	only the <b>id</b> key is used to give an identifier to the <b>omdoc</b> element resulting from the L <sup>A</sup> T <sub>E</sub> X <sub>XML</sub> transformation.
<b>omgroup</b>	The structure of the document is given by the <b>omgroup</b> environment just like in OMDoc. In the L <sup>A</sup> T <sub>E</sub> X route, the <b>omgroup</b> environment is flexibly mapped to sectioning commands, inducing the proper sectioning level from the nesting of <b>omgroup</b> environments. Correspondingly, the <b>omgroup</b> environment takes an optional key/value argument for metadata followed by a regular argument for the (section) title of the <b>omgroup</b> . The optional metadata argument has the
<b>id</b>	keys <b>id</b> for an identifier, <b>creators</b> and <b>contributors</b> for the Dublin Core meta-
<b>creators</b>	data [DCM03]; see [Koh15a] for details of the format. The <b>short</b> allows to give
<b>contributors</b>	a short title for the generated section. If the title contains semantic macros, they
<b>short</b>	need to be protected by <b>\protect</b> , and we need to give the <b>loadmodules</b> key it
<b>loadmodules</b>	needs no value. For instance we would have

```

\begin{module}{foo}
\symdef{bar}{Ba_r}
...
\begin{omgroup}[id=barderviv,loadmodules]
{Introducing $\protect\bar$ Derivations}

```

<b>blindomgroup</b>	<p> <math>\TeX</math> automatically computes the sectioning level, from the nesting of <b>omgroup</b> environments. But sometimes, we want to skip levels (e.g. to use a subsection* as an introduction for a chapter). Therefore the <b>omdoc</b> package provides a variant <b>blindomgroup</b> that does not produce markup, but increments the sectioning level and logically groups document parts that belong together, but where traditional document markup relies on convention rather than explicit markup. The <b>blindomgroup</b> environment is useful e.g. for creating frontmatter at the correct level. Example 1 shows a typical setup for the outer document structure of a book with parts and chapters. We use two levels of <b>blindomgroup</b>: </p> <ul style="list-style-type: none"> <li>• The outer one groups the introductory parts of the book (which we assume to have a sectioning hierarchy topping at the part level). This <b>blindomgroup</b> makes sure that the introductory remarks become a “chapter” instead of a “part”.</li> <li>• The inner one groups the frontmatter<sup>1</sup> and makes the preface of the book a section-level construct. Note that here the <b>display=flow</b> on the <b>omgroup</b> environment prevents numbering as is traditional for prefaces.</li> </ul>
---------------------	---

<b>\currentsectionlevel</b>	The <b>\currentsectionlevel</b> macro supplies the name of the current sectioning level, e.g. “chapter”, or “subsection”. <b>\CurrentSectionLevel</b> is the capitalized variant. They are useful to write something like “In this <b>\currentsectionlevel</b> , we will...” in an <b>omgroup</b> environment, where we do not know which sectioning level we will end up.
<b>\CurrentSectionLevel</b>	

<sup>1</sup>We shied away from redefining the **frontmatter** to induce a **blindomgroup**, but this may be the “right” way to go in the future.

```

\begin{document}
\begin{blindomgroup}
\begin{blindomgroup}
\begin{frontmatter}
\maketitle\newpage
\begin{omgroup}[display=flow]{Preface}
... <<preface>> ...
\end{omgroup}
\clearpage\setcounter{tocdepth}{4}\tableofcontents\clearpage
\end{frontmatter}
\end{blindomgroup}
... <<introductory remarks>> ...
\end{blindomgroup}
\begin{omgroup}{Introduction}
... <<intro>> ...
\end{omgroup}
... <<more chapters>> ...
\bibliographystyle{alpha}\bibliography{kwarc}
\end{document}

```

**Example 1:** A typical Document Structure of a Book

## 2.3 Ignoring Inputs

**ignore** The `ignore` environment can be used for hiding text parts from the document structure. The body of the environment is not PDF or DVI output unless the `showignores` option is given to the `omdoc` class or `package`. But in the generated OMDoc result, the body is marked up with a `ignore` element. This is useful in two situations. For

**editing** One may want to hide unfinished or obsolete parts of a document

**narrative/content markup** In  $\text{\LaTeX}$  we mark up narrative-structured documents. In the generated OMDoc documents we want to be able to cache content objects that are not directly visible. For instance in the `statements` package [Koh15c] we use the `\inlinedef` macro to mark up phrase-level definitions, which verbalize more formal definitions. The latter can be hidden by an `ignore` and referenced by the `verbalizes` key in `\inlinedef`.

## 2.4 Structure Sharing

`\STRlabel` The `\STRlabel` macro takes two arguments: a label and the content and stores the content for later use by `\STRcopy[⟨URL⟩]{⟨label⟩}`, which expands to the previously stored content. If the `\STRlabel` macro was in a different file, then we can give a URL `⟨URL⟩` that lets  $\text{\LaTeX}$ ML generate the correct reference.

`\STRcopy`

`\STRsemantics` The `\STRlabel` macro has a variant `\STRsemantics`, where the label argument is optional, and which takes a third argument, which is ignored in  $\text{\LaTeX}$ . This allows to specify the meaning of the content (whatever that may mean) in cases,

where the source document is not formatted for presentation, but is transformed into some content markup format.

## 2.5 Colors

For convenience, the `omdoc` package defines a couple of color macros for the `color` package: For instance `\blue` abbreviates `\textcolor{blue}`, so that `\blue{\langle something \rangle}` writes *\langle something \rangle* in blue. The macros `\red` `\green`, `\cyan`, `\magenta`, `\brown`, `\yellow`, `\orange`, `\gray`, and finally `\black` are analogous.

## 3 Limitations

In this section we document known limitations. If you want to help alleviate them, please feel free to contact the package author. Some of them are currently discussed in the `sTeX` GitHub repository [sTeX].

1. none reported yet

## 4 Implementation: The OMDoc Class

The functionality is spread over the `omdoc` class and package. The class provides the `document` environment and the `omdoc` element corresponds to it, whereas the package provides the concrete functionality.

`omdoc.dtx` generates four files: `omdoc.cls` (all the code between `<*cls>` and `</cls>`), `omdoc.sty` (between `<*package>` and `</package>`) and their L<sup>A</sup>T<sub>E</sub>XML bindings (between `<*ltxml.cls>` and `</ltxml.cls>` and `<*ltxml.sty>` and `</ltxml.sty>` respectively). We keep the corresponding code fragments together, since the documentation applies to both of them and to prevent them from getting out of sync.

The initial setup for L<sup>A</sup>T<sub>E</sub>XML (both package and class actually):

```
1 <*ltxml.sty | ltxml.cls>
2 # -*- CPERL -*-
3 package LaTeXML::Package::Pool;
4 use strict;
5 use LaTeXML::Package;
6 use LaTeXML::Util::Pathname;
7 use Cwd qw(abs_path);
8 </ltxml.sty | ltxml.cls>
```

### 4.1 Class Options

To initialize the `omdoc` class, we declare and process the necessary options. For `omdoc.cls` this is quite simple. We have options `report` and `book`, which set the `\omdoc@class` macro and pass on the macro to `omdoc.sty` for further processing. The `book` option also sets the conditional to true for the frontmatter handling later.

`\omdoc@class`  
`\ifclass@book`

```
9 <*cls>
10 \def\omdoc@class{article}
11 \DeclareOption{report}{\def\omdoc@class{report}%
12 \PassOptionsToPackage{\CurrentOption}{omdoc}}
13 \newif\ifclass@book\class@bookfalse
14 \DeclareOption{book}{\def\omdoc@class{book}\class@booktrue%
15 \PassOptionsToPackage{\CurrentOption}{omdoc}}
```

the rest of the options are only passed on to `omdoc.sty` and the class selected by the first options.

```
16 \DeclareOption*{\PassOptionsToClass{\CurrentOption}{\omdoc@class}
17 \PassOptionsToPackage{\CurrentOption}{omdoc}}
18 \ProcessOptions
19 </cls>
20 <*ltxml.cls>
21 \DeclareOption('report',sub {PassOptions('omdoc','sty',ToString(Digest(T_CS('\CurrentOption'))))}
22 \DeclareOption('book',sub {PassOptions('omdoc','sty',ToString(Digest(T_CS('\CurrentOption'))))}
23 \DeclareOption(undef,sub
24 {PassOptions('article','cls',ToString(Digest(T_CS('\CurrentOption'))))}
25 {PassOptions('omdoc','sty',ToString(Digest(T_CS('\CurrentOption'))))});}
```

```

26 ProcessOptions();
27 </ltxml.cls>

```

We load `article.cls`, and the desired packages. For the L<sup>A</sup>T<sub>E</sub>X<sub>ML</sub> bindings, we make sure the right packages are loaded.

```

28 <*cls>
29 \LoadClass{\omdoc@class}
30 \RequirePackage{etoolbox}
31 \RequirePackage{omdoc}
32 </cls>
33 <*ltxml.cls>
34 LoadClass('article');
35 RequirePackage('sref');
36 </ltxml.cls>

```

## 4.2 Setting up Namespaces and Schemata for L<sup>A</sup>T<sub>E</sub>X<sub>ML</sub>

Now, we also need to register the namespace prefixes for L<sup>A</sup>T<sub>E</sub>X<sub>ML</sub> to use.

```

37 <*ltxml.cls>
38 RegisterNamespace('omdoc'=>"http://omdoc.org/ns");
39 RegisterNamespace('om'=>"http://www.openmath.org/OpenMath");
40 RegisterNamespace('m'=>"http://www.w3.org/1998/Math/MathML");
41 RegisterNamespace('dc'=>"http://purl.org/dc/elements/1.1/");
42 RegisterNamespace('cc'=>"http://creativecommons.org/ns");
43 RegisterNamespace('stex'=>"http://kwarc.info/ns/sTeX");
44 RegisterNamespace('ltx'=>"http://dlmf.nist.gov/LaTeXML");
45 </ltxml.cls>

```

Since we are dealing with a class, we need to set up the document type in the L<sup>A</sup>T<sub>E</sub>X<sub>ML</sub> bindings.

```

46 <*ltxml.cls>
47 RelaxNGSchema('omdoc+ltxml',
48     '#default'=>"http://omdoc.org/ns",
49     'om'=>"http://www.openmath.org/OpenMath",
50     'm'=>"http://www.w3.org/1998/Math/MathML",
51     'dc'=>"http://purl.org/dc/elements/1.1/",
52     'cc'=>"http://creativecommons.org/ns",
53     'stex'=>"http://kwarc.info/ns/sTeX",
54     'ltx'=>"http://dlmf.nist.gov/LaTeXML");
55 </ltxml.cls>

```

Then we load the `omdoc` package `omdoc.sty`, which contains the main body of functionality (e.g.sectioning/grouping). It can be loaded by classes other than `omdoc.cls` as well.

```

56 <*ltxml.cls>
57 RequirePackage('omdoc');
58 </ltxml.cls>

```



### 4.3 Beefing up the document environment

Now, we will define the environments we need. The top-level one is the `document` environment, which we redefined so that we can provide keyval arguments.

`document` For the moment we do not use them on the  $\text{\LaTeX}$  level, but the document identifier is picked up by  $\text{\LaTeX}$ ML.

```

59 <*cls>
60 \let\orig@document=\document
61 \srefaddidkey{document}
62 \renewcommand{\document}[1][\metasetkeys{document}{#1}\orig@document}
63 </cls>
64 <*ltxml.cls>
65 sub xmlBase {
66   my $baseuri = LookupValue('URLBASE');
67   $baseuri =~ s\/$//g; # No trailing slashes
68   Tokenize($baseuri); }
69 DefEnvironment('{document} OptionalKeyVals:omdoc',
70   "<omdoc:omdoc "
71   . "&GetKeyVal(#1,'id')(xml:id='&GetKeyVal(#1,'id'))"
72   . "(?&Tokenize(&LookupValue('SOURCEBASE'))"
73   . "(xml:id='&Tokenize(&LookupValue('SOURCEBASE')).omdoc')()) "
74   . "&Tokenize(&LookupValue('URLBASE'))"
75   . "(xml:base='&xmlBase()')()>"
76   . "#body"
77   . "</omdoc:omdoc>",
78   beforeDigest=> sub { AssignValue(inPreamble=>0); },
79   afterDigest=> sub { $_[0]->getGullet->flush; return; },
80   afterDigestBegin => sub {
81     $_[1]->setProperty(id => Expand(T_CS('\thedocument@ID')));
82     if (my $ops = LookupValue('@at@begin@document')) {
83       Digest(Tokens(@$ops)); }
84     else {
85       return; } },
86   beforeDigestEnd => sub {
87     $_[0]->getGullet->flush;
88     if (my $ops = LookupValue('@at@end@document')) {
89       Digest(Tokens(@$ops)); }
90     else {
91       return; } },
92   mode => 'text');
93 Tag('omdoc:omdoc', 'afterOpen:late'=>\&insertFrontMatter,
94   afterOpen=>\&numberIt,afterClose=>\&locateIt);
95 </ltxml.cls>%$

```

## 5 Implementation: OMDoc Package

### 5.1 Package Options

The package options come in two parts: the first we only pass on to the various other  $\text{\TeX}$  packages.

```
96 <*package>
97 \DeclareOption{showmeta}{\PassOptionsToPackage{\CurrentOption}{metakeys}}
98 \DeclareOption{showmods}{\PassOptionsToPackage{\CurrentOption}{modules}}
99 \DeclareOption{extrefs}{\PassOptionsToPackage{\CurrentOption}{sref}}
100 \DeclareOption{noauxreq}{\PassOptionsToPackage{\CurrentOption}{modules}}
101 \DeclareOption{defindex}{\PassOptionsToPackage{\CurrentOption}{statements}}
102 </package>
103 <*ltxml.sty>
104 DeclareOption('showmeta',sub {PassOptions('metakeys','sty',ToString(Digest(T_CS('\CurrentOption
105 DeclareOption('showmods',sub {PassOptions('modules','sty',ToString(Digest(T_CS('\CurrentOption'
106 DeclareOption('extrefs',sub {PassOptions('sref','sty',ToString(Digest(T_CS('\CurrentOption'))))
107 DeclareOption('noauxreq',sub {PassOptions('modules','sty',ToString(Digest(T_CS('\CurrentOption'
108 DeclareOption('defindex',sub {PassOptions('statements','sty',ToString(Digest(T_CS('\CurrentOpti
109 </ltxml.sty>
```

For the rest we declare some switches which will modify the behavior according to the package options. Generally, an option `xxx` will just set the appropriate switches to true (otherwise they stay false). The `report` and `book` options affect the sectioning behavior of the `omgroup` environment via the `\section@level` macro later.

`\section@level`

```
110 <*package>
111 \newif\ifshow@ignores\show@ignorefalse
112 \DeclareOption{showignores}{\show@ignoretrue}
113 \newcount\section@level\section@level=2
114 \DeclareOption{report}{\section@level=1}
115 \DeclareOption{book}{\section@level=0}
116 \DeclareOption*{\PassOptionsToPackage{\CurrentOption}{sref}}
117 \ProcessOptions
118 </package>
119 <*ltxml.sty>
120 DeclareOption('showignores','');
121 DeclareOption('report','');
122 DeclareOption('book','');
123 DeclareOption(undef, '');
124 ProcessOptions();
125 </ltxml.sty>
```

Then we need to set up the packages by requiring the `sref` package to be loaded.

```
126 <*package>
127 \RequirePackage{sref}
128 \RequirePackage{xspace}
129 \RequirePackage{comment}
```

```

130 \RequirePackage{etoolbox}
131 \end{package}
132 \end{*ltxml.sty}
133 \RequirePackage('sref');
134 \RequirePackage('xspace');
135 \RequirePackage('omtext');
136 \end{*ltxml.sty}

```

## 5.2 Document Structure

The structure of the document is given by the `omgroup` environment just like in OMDoc. The hierarchy is adjusted automatically according to the  $\text{\LaTeX}$  class in effect.

`\currentsectionlevel`

```

137 \begin{package}
138 \def\currentsectionlevel{document\xspace}%
139 \def\Currentsectionlevel{Document\xspace}%
140 \end{package}
141 \end{*ltxml.sty}
142 \DefMacro('currentsectionlevel', '@currentsectionlevel\xspace');
143 \DefMacro('Currentsectionlevel', '@Currentsectionlevel\xspace');
144 \DefConstructor('@currentsectionlevel',
145               "<ltx:text class='omdoc-currentsectionlevel'>section</ltx:text>");
146 \DefConstructor('@CurrentSectionLevel',
147               "<ltx:text class='omdoc-Currentsectionlevel'>Section</ltx:text>");
148 \end{*ltxml.sty}

```

`blindomgroup`

```

149 \begin{package}
150 \newcommand\at@begin@blindomgroup[1]{%
151 \newenvironment{blindomgroup}
152 {\advance\section@level by 1\at@begin@blindomgroup\setion@level}
153 {\advance\section@level by -1}
154 }
155 \end{package}
156 \end{*ltxml.sty}
157 \DefEnvironment('{blindomgroup} OptionalKeyVals:omgroup',
158               "<omdoc:omgroup layout='invisible'"
159               . " ?&GetKeyVal(#1,'id')(xml:id='&GetKeyVal(#1,'id')')()"
160               . " ?&GetKeyVal(#1,'type')(type='&GetKeyVal(#1,'type')')()>\n"
161               . "#body\n"
162               . "</omdoc:omgroup>");
163 \end{*ltxml.sty}

```

`\omgroup@c1` Convenience macro: defines the `\currentsectionlevel` macro from the keywords in the arguments

```

163 \begin{package}
164 \newcommand\omgroup@c1[2]{%
165 \def\currentsectionlevel{#1\xspace}%

```

```

166 \def\Currentsectionlevel{#2\hspace{}}

\omgroup@nonum convenience macro: \omgroup@nonum{<level>}{<title>} makes an unnumbered sectioning with title <title> at level <level>.
167 \newcommand\omgroup@nonum[2]{%
168 \ifx\hyper@anchor\@undefined\else\phantomsection\fi%
169 \addcontentsline{toc}{#1}{#2}\@nameuse{#1}*{#2}}

\omgroup@num convenience macro: \omgroup@num{<level>}{<title>} makes numbered sectioning with title <title> at level <level>. We have to check the short key was given in the omgroup environment and – if it is use it. But how to do that depends on whether the rdfmata package has been loaded.
170 \newcommand\omgroup@num[2]{\sref@label@id{\omdoc@sect@Name~\@nameuse{the#1}}}%
171 \ifx\omgroup@short\@empty\@nameuse{#1}{#2}%
172 \else\@ifundefined{rdfmata@sectioning}{\@nameuse{#1}[\omgroup@short]{#2}}%
173 {\@nameuse{rdfmata@#1@old}[\omgroup@short]{#2}}%
174 \fi}
175 \end{package}

omgroup
176 \begin{package}
177 \def\@true{true}
178 \def\@false{false}
179 \srefaddidkey{omgroup}
180 \addmetakey{omgroup}{date}
181 \addmetakey{omgroup}{creators}
182 \addmetakey{omgroup}{contributors}
183 \addmetakey{omgroup}{srccite}
184 \addmetakey{omgroup}{type}
185 \addmetakey*{omgroup}{short}
186 \addmetakey*{omgroup}{display}
187 \addmetakey[false]{omgroup}{loadmodules}[true]

we define a switch for numbering lines and a hook for the beginning of groups:
\at@begin@omgroup The \at@begin@omgroup macro allows customization. It is run at the beginning of the omgroup, i.e. after the section heading.
188 \newif\if@num\@numtrue
189 \newif\if@frontmatter\@frontmatterfalse
190 \newif\if@backmatter\@backmatterfalse
191 \newcommand\at@begin@omgroup[3][]{\{}

Then we define a helper macro that takes care of the sectioning magic. It comes with its own key/value interface for customization.
192 \addmetakey{omdoc@sect}{name}
193 \addmetakey{omdoc@sect}{Name}
194 \addmetakey[false]{omdoc@sect}{clear}[true]
195 \addmetakey{omdoc@sect}{ref}
196 \addmetakey[false]{omdoc@sect}{num}[true]
197 \newcommand\omdoc@sectioning[3][]{\metasetkeys{omdoc@sect}{#1}%

```

```

198 \ifx\omdoc@sect@clear\@true\cleardoublepage\fi%
199 \if@num% numbering not overridden by frontmatter, etc.
200 \ifx\omdoc@sect@num\@true\omgroup@num{#2}{#3}\else\omgroup@nonum{#2}{#3}\fi
201 \omgroup@c1\omdoc@sect@name\omdoc@sect@Name
202 \else\omgroup@nonum{#2}{#3}\fi}

```

and another one, if redefines the `\addtocontentsline` macro of L<sup>A</sup>T<sub>E</sub>X to import the respective macros. It takes as an argument a list of module names.<sup>2</sup>

```

203 \newcommand\omgroup@redefine@addtocontents[1]{\edef\@import{#1}%
204 \@for\@I:=\@import\do{\edef\@path{\csname module@\@I @path\endcsname}%
205 \@ifundefined{tf@toc}\relax{\protected@write\@tf@toc}{\string\@requiremodules{\@path}{sms}}}}
206 \ifx\hyper@anchor\@undefined% hyperref.sty loaded?
207 \def\addcontentsline##1##2##3{%
208 \addtocontents{##1}{\protect\contentsline{##2}{\string\importmodules{##1}{##3}{\thepage}}}%
209 \else\def\addcontentsline##1##2##3{%
210 \addtocontents{##1}{\protect\contentsline{##2}{\string\importmodules{##1}{##3}{\thepage}}{\@current
211 \fi}% hyperref.sty loaded?

```

now the `omgroup` environment itself. This takes care of the table of contents via the helper macro above and then selects the appropriate sectioning command from `article.cls`.

```

212 \newenvironment{omgroup}[2][ ]% keys, title
213 {\metasetkeys{omgroup}{#1}\sref@target%
214 \ifx\omgroup@display\st@flow\@numfalse\fi
215 \if@frontmatter\@numfalse\fi

```

If the `loadmodules` key is set on `\begin{omgroup}`, we redefine the `\addcontetsline` macro that determines how the sectioning commands below construct the entries for the table of contents.

```

216 \ifx\omgroup@loadmodules\@true%
217 \omgroup@redefine@addtocontents{\@ifundefined{mod@id}\imported@modules%
218 {\@ifundefined{module@\mod@id @path}{\imported@modules}\mod@id}}\fi%
219 \advance\section@level by 1
220 \ifcase\section@level%
221 \or\omdoc@sectioning[name=part,Name=Part,clear,num]{part}{#2}%
222 \or\omdoc@sectioning[name=chapter,Name=Chapter,clear,num]{chapter}{#2}%
223 \or\omdoc@sectioning[name=section,Name=Section,num]{section}{#2}%
224 \or\omdoc@sectioning[name=subsection,Name=Subsection,num]{subsection}{#2}%
225 \or\omdoc@sectioning[name=subsubsection,Name=Subsubsection,num]{subsubsection}{#2}%
226 \or\omdoc@sectioning[name=paragraph,Name=Paragraph,ref=this paragraph]{paragraph}{#2}%
227 \or\omdoc@sectioning[name=subparagraph,Name=Subparagraph,ref=this subparagraph]{paragraph}{#2}%
228 \fi% \ifcase
229 \at@begin@omgroup[#1]\section@level{#2}}% for customization
230 {\advance\section@level by -1}
231 \end{package}

```

---

<sup>2</sup>EdNOTE: MK: the extension `sms` is hard-coded here, but should not be. This will not work in multilingual settings.

```

232 <*lxml.sty>
233 DefEnvironment('{omgroup} OptionalKeyVals:omgroup {}',
234               "<omdoc:omgroup layout='sectioning'"
235               .   "?&GetKeyVal(#1,'id')(xml:id='&GetKeyVal(#1,'id')')()"
236               .   "?&GetKeyVal(#1,'type')(type='&GetKeyVal(#1,'type')')()>\n"
237               .   "<dc:title>#2</dc:title>\n"
238               .   "#body\n"
239               .   "</omdoc:omgroup>");
240 </lxml.sty>

```

### 5.3 Front and Backmatter

Index markup is provided by the `omtext` package [Koh15b], so in the `omdoc` package we only need to supply the corresponding `\printindex` command, if it is not already defined

```

\printindex
241 <*package>
242 \providecommand\printindex{\IfFileExists{\jobname.ind}{\input{\jobname.ind}}{}}
243 </package>
244 <*lxml.sty>
245 DefConstructor('\printindex','<omdoc:index/>');
246 Tag('omdoc:index',afterOpen=>\&numberIt,afterClose=>\&locateIt);
247 </lxml.sty>

```

`\tableofcontents` The table of contents already exists in  $\text{\LaTeX}$ , so we only need to provide a  $\text{\LaTeX}$ ML binding for it.

```

248 <*lxml.sty>
249 DefConstructor('\tableofcontents',
250               "<omdoc:tableofcontents level='&ToString(&CounterValue('tocdepth'))'/>");
251 Tag('omdoc:tableofcontents',afterOpen=>\&numberIt,afterClose=>\&locateIt);
252 </lxml.sty>

```

The case of the `\bibliography` command is similar

`\bibliography`

```

253 <*lxml.sty>
254 DefConstructor('\bibliography{}','<omdoc:bibliography files='#1'/>');
255 Tag('omdoc:bibliography',afterOpen=>\&numberIt,afterClose=>\&locateIt);
256 </lxml.sty>

```

`frontmatter` `book.cls` already has a `\frontmatter` macro, so we have to redefine the front matter environment in this case.

```

257 <*cls>
258 \ifclass@book
259 \renewenvironment{frontmatter}
260 {\@frontmattertrue\cleardoublepage\@mainmatterfalse\pagenumbering{roman}}
261 {\@frontmatterfalse\setcounter{page}{1}\pagenumbering{arabic}}

```

```

262 \else
263 \newenvironment{frontmatter}
264 {\@frontmattertrue\pagenumbering{roman}}
265 {\@frontmatterfalse\setcounter{page}{1}\pagenumbering{arabic}}
266 \fi
267 \</cls>
268 \<!--*ltxml.cls-->
269 DefEnvironment('{frontmatter}', '#body');
270 \</ltxml.cls>
271 % \End{macrocode}
272 % \end{environment}
273 %
274 % \begin{environment}{backmatter}
275 % |book.cls| already has a |\backmatter| macro, so we have to redefine the back
276 % matter environment in this case.
277 % \begin{macrocode}
278 \<!--*cls-->
279 \ifclass@book
280 \renewenvironment{backmatter}
281 {\cleardoublepage\@mainmatterfalse\@backmattertrue}
282 {\@backmatterfalse}
283 \else
284 \newenvironment{backmatter}{\@backmattertrue}{\@backmatterfalse}
285 \fi
286 \</cls>
287 \<!--*ltxml.cls-->
288 DefEnvironment('{backmatter}', '#body');
289 \</ltxml.cls>

```

## 5.4 Ignoring Inputs

ignore

```

290 \<!--*package-->
291 \ifshow@ignores
292 \addmetakey{ignore}{type}
293 \addmetakey{ignore}{comment}
294 \newenvironment{ignore}[1]{}
295 {\metasetkeys{ignore}{#1}\textless\ignore@type\textgreater\bgrou\itshape}
296 {\egrou\textless/\ignore@type\textgreater}
297 \renewenvironment{ignore}{}{} \else\excl\comment{ignore}\fi
298 \</package>
299 \<!--*ltxml.sty-->
300 DefKeyVal('ignore', 'type', 'Semiverbatim');
301 DefKeyVal('ignore', 'comment', 'Semiverbatim');
302 DefEnvironment('{ignore} OptionalKeyVals:ignore',
303 " <omdoc:ignore %&GetKeyVals(#1)>#body</omdoc:ignore>");
304 Tag('omdoc:ignore', afterOpen=>\&numberIt, afterClose=>\&locateIt);
305 \</ltxml.sty>

```

## 5.5 Structure Sharing

`\STRlabel` The main macro, it is used to attach a label to some text expansion. Later on, using the `\STRcopy` macro, the author can use this label to get the expansion originally assigned.

```
306 <*package>
307 \long\def\STRlabel#1#2{\STRlabeldef{#1}{#2}{#2}}
308 </package>
309 <*ltxml.sty>
310 DefConstructor('\STRlabel{}{}', sub {
311   my($document,$label,$object)=@_;
312   $document->absorb($object);
313   $document->addAttribute('xml:id'=>ToString($label)) if $label; });
314 </ltxml.sty>
```

`\STRcopy` The `\STRcopy` macro is used to call the expansion of a given label. In case the label is not defined it will issue a warning.<sup>3</sup>

```
315 <*package>
316 \newcommand\STRcopy[2] [] {\expandafter\ifx\csname STR@#2\endcsname\relax
317 \message{STR warning: reference #2 undefined!}
318 \else\csname STR@#2\endcsname\fi}
319 </package>
320 <*ltxml.sty>
321 DefConstructor('\STRcopy[]{}', "<omdoc:ref xref='#1##2' />");
322 Tag('omdoc:ref', afterOpen=>\&numberIt, afterClose=>\&locateIt);
323 </ltxml.sty>
```

`\STRsemantics` if we have a presentation form and a semantic form, then we can use

```
324 <*package>
325 \newcommand\STRsemantics[3] [] {#2\def\@test{#1}\ifx\@test\empty\STRlabeldef{#1}{#2}\fi}
326 </package>
327 <*ltxml.sty>
328 DefConstructor('\STRsemantics[]{}{}', sub {
329   my($document,$label,$ignore,$object)=@_;
330   $document->absorb($object);
331   $document->addAttribute('xml:id'=>ToString($label)) if $label; });
332 </ltxml.sty>##$
```

`\STRlabeldef` This is the macro that does the actual labeling. Is it called inside `\STRlabel`

```
333 <*package>
334 \def\STRlabeldef#1{\expandafter\gdef\csname STR@#1\endcsname}
335 </package>
336 <*ltxml.sty>
337 DefMacro('\STRlabeldef{}{}', "");
338 </ltxml.sty>
```

---

<sup>3</sup>EDNOTE: MK: we need to do something about the ref!



## 5.6 Colors

blue, red, green, magenta We will use the following abbreviations for colors from `color.sty`

```
339 <*package>
340 \def\black#1{\textcolor{black}{#1}}
341 \def\gray#1{\textcolor{gray}{#1}}
342 \def\blue#1{\textcolor{blue}{#1}}
343 \def\red#1{\textcolor{red}{#1}}
344 \def\green#1{\textcolor{green}{#1}}
345 \def\cyan#1{\textcolor{cyan}{#1}}
346 \def\magenta#1{\textcolor{magenta}{#1}}
347 \def\brown#1{\textcolor{brown}{#1}}
348 \def\yellow#1{\textcolor{yellow}{#1}}
349 \def\orange#1{\textcolor{orange}{#1}}
350 </package>
```

For the  $\text{\LaTeX}$ ML bindings, we go a generic route, we replace `\blue{#1}` by `{\@omdoc@color{blue}\@omdoc@color@content{#1}}`.

```
351 <*ltxml.sty>
352 sub omdocColorMacro {
353   my ($color, @args) = @_;
354   my $tok_color = TokenizeInternal($color);
355   (T_BEGIN, T_CS('\@omdoc@color'), T_BEGIN, $tok_color->unlist,
356    T_END, T_CS('\@omdoc@color@content'), T_OTHER(''), $tok_color->unlist, T_OTHER('')),
357   T_BEGIN, $args[1]->unlist, T_END, T_END); }
358 DefMacro('\@omdoc@color{', sub { MergeFont(color=>$_[1]->toString); return; });#$
359 </ltxml.sty>
```

Ideally, here we will remove the optional argument and have a conversion module add the attribute at the end (or maybe add it just for math?) or, we can take the attributes for style from the current font ?

```
360 <*ltxml.sty>
361 DefConstructor('\@omdoc@color@content[]{}',
362   "?#isMath(#2)(<ltx:text ?#1(style='color:#1')()>#2</ltx:text>)");
363 foreach my $color(qw(black gray blue red green cyan magenta brown yellow orange)) {
364   DefMacro("\\".$color.'{}', sub { omdocColorMacro($color, @_); }); }#$
365 </ltxml.sty>
```

## 5.7 $\text{\LaTeX}$ Commands we interpret differently

The reinterpretations are quite simple, we either disregard presentational markup or we re-interpret it in terms of OMDoc.

```
366 <*ltxml.sty>
367 DefConstructor('\newpage', '');
368 </ltxml.sty>
```

## 5.8 Leftovers

```
369 <*package>
```

```

370 \newcommand\baseURI[2] [] {}
371 \end{package}
372 \end{ltxml.sty}
373 DefMacro('\baseURI []Semiverbatim', sub {
374   my $baselocal = ToString(Digest($_[1]));
375   $baselocal = abs_path($baselocal) unless $baselocal =~ /^(w+):\/\//;
376   AssignValue('BASELOCAL'=>$baselocal,'global');
377   AssignValue('URLBASE'=>ToString(Digest($_[2])), 'global');
378 });
379 \end{ltxml.sty}%$

```

EdN:4 <sup>4</sup> and finally, we need to terminate the file with a success mark for perl.

```

380 \end{ltxml.sty | ltxml.cls}1;

```

---

<sup>4</sup>EDNOTE: this should be handled differently, omdoc.sty should include url and give a new macro for it, which we then use in omdoc

## References

- [DCM03] The DCMI Usage Board. *DCMI Metadata Terms*. DCMI Recommendation. Dublin Core Metadata Initiative, 2003. URL: <http://dublincore.org/documents/dcmi-terms/>.
- [Koh06] Michael Kohlhase. OMDOC – *An open markup format for mathematical documents [Version 1.2]*. LNAI 4180. Springer Verlag, Aug. 2006. URL: <http://omdoc.org/pubs/omdoc1.2.pdf>.
- [Koh15a] Michael Kohlhase. *dcm.sty: An Infrastructure for marking up Dublin Core Metadata in L<sup>A</sup>T<sub>E</sub>X documents*. Tech. rep. Comprehensive T<sub>E</sub>X Archive Network (CTAN), 2015. URL: <http://www.ctan.org/tex-archive/macros/latex/contrib/stex/dcm/dcm.pdf>.
- [Koh15b] Michael Kohlhase. *omtext: Semantic Markup for Mathematical Text Fragments in L<sup>A</sup>T<sub>E</sub>X*. Tech. rep. Comprehensive T<sub>E</sub>X Archive Network (CTAN), 2015. URL: <http://www.ctan.org/tex-archive/macros/latex/contrib/stex/omtext/omtext.pdf>.
- [Koh15c] Michael Kohlhase. *statements.sty: Structural Markup for Mathematical Statements*. Tech. rep. Comprehensive T<sub>E</sub>X Archive Network (CTAN), 2015. URL: <http://www.ctan.org/tex-archive/macros/latex/contrib/stex/statements/statements.pdf>.
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