# The latex-lab-sec package
# Changes related to the tagging of sectioning commands

LaTeX Project*

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**Abstract**

The following code implements a first draft for the tagging of heading commands.

## 1 New implementation with templates

Various parts of this module are obsolete as the commands have been reimplemented in the module `latex-lab-sec-template` with templates. The tagging sockets are still relevant.

In a later step both files will be merged.

## 2 Limitations

Heading commands are in general not defined by the format but by the classes. Their implementation vary: some are defined with the help of `\@startsection`, some are like `\chapter` handcrafted, some built with the help of extension packages or as in the KOMA classes with class code that extends the `\@startsection` functionality.

The following code can therefore currently be used *only* with the standard classes or with classes which do not overwrite the changed definitions.

## 3 Introduction

Tagging of heading commands consist of two parts:

- The *title text* of the heading should be surrounded by a structure with a *heading tag*, typically `Hn` with some value of `n`. In theory, one could/should put the number of the heading in an `Lbl` structure. However, current AT doesn't handle this well, so we use a tag `section-number` that is role-mapped to `Span`. The number of the `Hn` tag should reflect the "natural" level. So in an article `\section` will use `H1`, in a book `\chapter` will use `H1` and `\section` `H2`. Titles of `\part` are a bit out of this system as they are normally not part of the hierarchy: often only some chapters are grouped under a part. Their title is therefore tagged as `Title`.

Now `heading-number` role-mapped to `Lbl` or does this need to be Span in 1.7?

*Initial implementation done by Ulrike Fischer

- The whole section (title and all the text body) should normally be surrounded by a `Sect` tag. Parts (started with the `\part` command) are surrounded currently by `Part` until the next `\part` or a command like `\backmatter`. It is a bit unclear if the headings should be inside or outside of these structures—the best practice guide puts them outside—but on the whole it seems more logical to group the heading together with the text inside the `Sect`. For `\part` this is actually required, as there can be only one `Title` in a structure, so the part title can't be at the same level as the document `Title`.

  Starting such an enclosing `Sect` structure is rather easy, but closing it requires code in various place, for example, the commands `\mainmatter`, `\backmatter`, `\frontmatter` and `\appendix` should typically close everything. Following heading commands should close all previous structures with a level equal or higher than their own level.

# 4 Technical details and problems

The implementation has to take care of various details.

- As heading commands in LaTeX are not environments, the `<Sect>` structures can be wrongly nested with other structures. For example if a document puts a heading command into a list or a trivlist or a minipage then it can no longer close previous `<Sect>` structures correctly. In minipages and parboxes we now avoid the problem by not using `<Sect>` structures for headings. In other places can be detected by checking the structure stack and a warning can be issued, but the author then has to close the structures manually before, e.g., the list.

  Thus there have to be user interfaces to handle such cases. It should also be possible not to create all the `<Sect>` structures automatically but to tag only the headings so that the author can handle special cases manually.

- If hyperref is used, targets for links should be inserted, either with `\refstepcounter` or manually with `\MakeLinkTarget`. These targets must be in the correct structure for the structure destinations. They replace some of the current patches in hyperref.

## 4.1 TODO

- A dedicated command to close a `Sect` unit should be provided.
- A dedicated command to open a `Sect` unit should be provided too.
- It should also be possible to put an epigraph or similar in front of a heading command, that is still inside the `Sect` unit.
- The number in `\part` and `\chapter` is currently not correctly tagged as a `section-number` as this requires to redefine the internal (class dependent) commands too.

no longer correct in the template version

1 ⟨*package⟩

# 5 Implementation

```
\ProvidesExplPackage {latex-lab-testphase-sec} {\ltlabsecdate} {\ltlabsecversion}
  {Code related to the tagging of heading commands}
```

.

## 5.1 Surrounding by Sect structures

We use a stack to record the levels of the open Sect. The first item has level −100. A heading command will take a record from the stack. If its level is greater or equal it closes this structure and takes the next record from the stack. If the record has a smaller level then it puts it back and stops. The stack is compared with the main structure stack, if they don't match it means we can't safely close the Sect and so we issue a warning and do nothing.

⟨/package⟩

⟨*package⟩
⟨@@=tag⟩

### 5.1.1 Tagging commands

\g__tag_sec_stack_seq The stack holds the tag, the level and the structure number.

```
\seq_new:N   \g__tag_sec_stack_seq
\seq_gpush:Nn\g__tag_sec_stack_seq {{Document}{-100}{2}}
```

__tag_get_data_current_Sect: This allows to retrieve the number of the current Sect structure (or Document if we are outside any Sect) with \tag_get:n{current_Sect}

```
\cs_new:Npn \__tag_get_data_current_Sect:
 {
   \exp_last_unbraced:Ne\use_iii:nnn{\seq_item:Nn\g__tag_sec_stack_seq{1}}
 }
```

(*End of definition for* __tag_get_data_current_Sect:.)

\l__tag_sec_Sect_bool This boolean controls if a Sect structure is opened.

```
\bool_new:N     \l__tag_sec_Sect_bool
\bool_set_true:N\l__tag_sec_Sect_bool
```

\l__tag_sec_tmpa_tl
\l__tag_sec_tmpb_tl Temp variables

```
\tl_new:N     \l__tag_sec_tmpa_tl
\tl_new:N     \l__tag_sec_tmpb_tl
```

__tag_sec_begin:nn

This starts a `Sect` unit structure (the „Sect environment“). Currently the default tag is either Sect or Part, depending on the level, but this can be changed by adapting the symbolic structure names which are built from the level. The second argument allows to add more options but is currently unused.

```
\cs_new_protected:Npn\__tag_sec_begin:nn #1 #2 %#1 level #2 keyval
  {
    \tag_struct_begin:n
      {
         tag= \UseStructureName{sec/#1}
        ,#2
      }
    \tag_get:nN{struct_tag}\l__tag_sec_tmpa_tl
    \seq_gpush:Ne \g__tag_sec_stack_seq
      {{\l__tag_sec_tmpa_tl}{\int_eval:n{#1}}{\g__tag_struct_stack_current_tl}}
  }
\cs_generate_variant:Nn \__tag_sec_begin:nn {en}
```

(*End of definition for* `\__tag_sec_begin:nn`.)

__tag_sec_end:n

```
\msg_new:nnn { tag } {wrong-sect-nesting}
  {
    The~structure~#1~can~not~be~closed.\\
    It~is~not~equal~to~the~current~structure~#2~on~the~main~stack
  }

\cs_new_protected:Npn\__tag_sec_end:n #1 % #1 level
  {
    \seq_get:NN \g__tag_sec_stack_seq \l__tag_sec_tmpa_tl
    \int_compare:nNnT {#1}<{\exp_last_unbraced:NV\use_ii:nnn\l__tag_sec_tmpa_tl+1}
      {
        \tag_get:nN{struct_tag}\l__tag_sec_tmpb_tl
        \exp_args:Nee
          \tl_if_eq:nnTF
            {\exp_last_unbraced:NV\use_i:nnn\l__tag_sec_tmpa_tl}
            {\l__tag_sec_tmpb_tl}
            {
              \seq_gpop:NN \g__tag_sec_stack_seq \l__tag_sec_tmpa_tl
              \tag_struct_end:
              \__tag_sec_end:n {#1}
            }
            {
              \msg_warning:nnee {tag}{wrong-sect-nesting}
               { \exp_last_unbraced:NV\use_i:nnn \l__tag_sec_tmpa_tl }
               { \l__tag_sec_tmpb_tl }
            }
      }
  }
```

(*End of definition for* `\__tag_sec_end:n`.)

__tag_sec_title_split:
__tag_sec_restore_para:

A runin-heading command must separate the heading title from the following text. The code is in an `\everypar` which is perhaps executed in a group (e.g. when a list follows), we have to ensure that the restoring of the para can escape.

```
\cs_new_protected:Npn\__tag_sec_restore_para:
```

```
 {
   \UseTaggingSocket {para/restore}
   \if_int_compare:w \tex_currentgrouptype:D =14        % semi-simple group
     \group_insert_after:N \__tag_sec_restore_para:
   \else:
       \if_int_compare:w \tex_currentgrouptype:D =\c_one_int  % simple group
         \group_insert_after:N \__tag_sec_restore_para:
       \fi:
   \fi:
 }
\cs_new_protected:Npn \__tag_sec_title_split:
  {
```

This ends the title structure. As the begin is from the automatic (flattened) para-tagging we have to increase the counter.

```
    \UseTaggingSocket{para/textblock/end}%
```

In case something (e.g. a list) did reset the boolean we need to close also a semantic paragraph.

```
    \bool_if:NF\l__tag_para_flattened_bool
      {\UseTaggingSocket{para/semantic/end}{}}
```

Now restore the para-tagging and start a normal paragraph:

```
    \__tag_sec_restore_para:
    \UseTaggingSocket{para/begin}
  }
```

(*End of definition for* `\__tag_sec_title_split:` *and* `\__tag_sec_restore_para:`.)

`\__tag_sec_title_begin:nnn` This command is used in the socket at the begin of display heading commands like part and chapter. It takes three arguments: the level, the title, and additional options.

```
\cs_new_protected:Npn \__tag_sec_title_begin:nnn #1 #2 #3%level, title
  {
    \pdf_purify:nN{#2}\l__tag_sec_tmpa_tl
    \tag_struct_begin:n{tag=\UseStructureName{sec/#1/title},title-o={\l__tag_sec_tmpa_tl},#3}
    \bool_set_true:N\l__tag_para_flattened_bool
    \AssignStructureRole{para/textblock}{\UseStructureName{sec/#1/fragment}}
  }
```

(*End of definition for* `\__tag_sec_title_begin:nnn`.)

`\__tag_sec_title_end:`

```
\cs_new_protected:Npn \__tag_sec_title_end:
  {
    \tag_struct_end: %P = Hn
    \UseTaggingSocket{para/restore}
  }
```

(*End of definition for* `\__tag_sec_title_end:`.)

`\__tag_set_title_hang:nNnn` To be able to correctly tag the number and insert the link target in the title of a sectioning command created with `\@startsection` we need a special`\@hangfrom` variant. This is a bit tricky: The argument contains the link target and for a correct structure destination it should be typeset *after* the structure has been opened. But to measure the hangindent it must be typeset *before* the paragraph is started. This means that we have to open

the title structure manually and then have to suppress the para-tagging. Additionally there is an engine difference: with pdftex the literals for the mc are inserted with the box after the paragraph has started but luatex sets the attributes before and we have to reset them. Hiding all this in a tagging socket is non-trivial. The code assumes that we are in vmode! Attention: The code opens a structure that it doesn't close (it is closed by the `\par`). It therefore does not handle the full tagging of the title. In a new implementation of the sectioning command this will perhaps have to change. Note: This command is not used in the new template code, only in the v1-templates.

```
\cs_new_protected:Npn \__tag_set_title_hang:nNnn #1 #2 #3 #4
  %#1 level,
  %#2 boolean: nonumber? (will be later \l__head_nonumber_bool)
  %#3 formatted number /hang space
  %#4 title
```

The handling of the title is not perfect. It would be better to pass it through something like `\GetTitleString`. TODO.

```
  {
    \pdf_purify:nN {#4}\l__tag_sec_tmpa_tl
    \noindent
    \tag_struct_gput:nne {\tag_get:n{struct_num}}{title}{\l__tag_sec_tmpa_tl}
    \bool_if:NTF #2
     {
       \setbox\@tempboxa\hbox{{#3}}
       \hangindent \wd\@tempboxa
       \box\@tempboxa
     }
     {
      \UseTaggingSocket{inline/begin}{tag=\UseStructureName{sec/#1/number}}
       \setbox\@tempboxa\hbox{{#3}}
       \hangindent \wd\@tempboxa
       \box\@tempboxa
      \UseTaggingSocket{inline/end}
     }
  }
```

(*End of definition for* `\__tag_set_title_hang:nNnn`.)

`\__tag_sec_title_runin_number:nn`

```
\cs_new_protected:Npn \__tag_sec_title_runin_number:nNn #1 #2 #3 %#1 level, #2 boolean no num
  {
    \bool_if:NTF #2
    { #3 }
    {
      \tag_mc_end_push:
      \tag_struct_begin:n{tag=\UseStructureName{sec/#1/number}}
      \tag_mc_begin:n{}
      #3
      \tag_mc_end:
      \tag_struct_end:
      \tag_mc_begin_pop:n{}
    }
  }
```

(*End of definition for* `\__tag_sec_title_runin_number:nn`.)

Open sec structures should be closed at the end of the document. This should be done before tagpdf closes the Document structure.

```
\hook_gput_code:nnn
  {tagpdf/finish/before}
  {tagpdf/sec}
  {\AssignTaggingSocketPlug{sec/end}{kernel}\UseTaggingSocket{sec/end}{-10}}
\hook_gset_rule:nnnn {tagpdf/finish/before}{tagpdf/sec}{before}{tagpdf}
```

The commands `\mainmatter`, `\backmatter`, `\frontmatter` and `\appendix` close all `Sect` and `Part` structures.

```
\AddToHook{cmd/frontmatter/before}{\par\UseTaggingSocket{sec/end}{-10}}
\AddToHook{cmd/mainmatter/before} {\par\UseTaggingSocket{sec/end}{-10}}
\AddToHook{cmd/backmatter/before} {\par\UseTaggingSocket{sec/end}{-10}}
\AddToHook{cmd/appendix/before}   {\par\UseTaggingSocket{sec/end}{-10}}
```

## 5.2 Tagging Sockets

First the sockets that handle the Sect structures.

The argument of the begin socket consists of two brace groups, in the first brace is the level, in the second the keys for the structure.

```
\NewTaggingSocketPlug{sec/begin}{kernel}
  {
     \__tag_sec_begin:en #1
  }
\AssignTaggingSocketPlug{sec/begin}{kernel}
```

The end socket takes as argument only the level to close.

```
\NewTaggingSocketPlug{sec/end}{kernel}
  {
     \__tag_sec_end:n {#1}
  }
\AssignTaggingSocketPlug{sec/end}{kernel}
```

These two sockets handle the tagging of headings titles with special formatting like part and chapter. The argument of the begin socket is two brace groups containing the level and the title, the third argument of the internal command is in the default socket empty.

```
\NewTaggingSocketPlug{sec/title/begin}{kernel}
 {
   \__tag_sec_title_begin:nnn #1 {}
 }
\AssignTaggingSocketPlug{sec/title/begin}{kernel}
```

The end socket does not take an argument. It only closes the structures and restores the para settings.

```
\NewTaggingSocketPlug{sec/title/end}{kernel}
 {
   \__tag_sec_title_end:
 }
\AssignTaggingSocketPlug{sec/title/end}{kernel}
```

The `sec/title/hang` socket is used to typeset a heading title using `\@hangfrom`. It is the most tricky one. It takes two arguments. The second argument of this socket will pass the normal `\@hangfrom` command if tagging is not active. It is not used with tagging. The first argument passes four brace groups: the level, a boolean for "nonumber", the actual content of the number and the title.

Attention: The socket opens a structure that it doesn't close (it is closed by the `\par`). It therefore does not handle the full tagging of the title. In a new implementation of the heading command this will perhaps have to change.

```
\NewTaggingSocketPlug{sec/title/hang}{kernel}
  {
    \__tag_set_title_hang:nNnn #1
  }
\AssignTaggingSocketPlug{sec/title/hang}{kernel}
```

The `sec/title/init` socket is used to do some initialization for heading commands that are set up with `\@startsection`. It sets the tag name and flattens the para-tagging. It is mostly needed for run-in headings which set the heading inside `\everypar`. It takes 1 argument, the level.

```
\NewTaggingSocketPlug{sec/title/init}{kernel}
 {
   \AssignStructureRole{para/textblock}{\UseStructureName{sec/#1/title}}
   \bool_set_true:N \l__tag_para_flattened_bool
 }
\AssignTaggingSocketPlug{sec/title/init}{kernel}
```

This socket handles the tagging between a run-in heading and the following text. It takes no argument.

```
\NewTaggingSocketPlug{sec/title/split}{kernel}
 {
   \__tag_sec_title_split:
 }
\AssignTaggingSocketPlug{sec/title/split}{kernel}
```

The following tagging socket command is used to handle the tagging of the number in the title of run-in headings. Similar to the hang variant it does not handle the full structure but relies in part on the paragraph tagging. This again can change if sectioning commands are reimplemented. It takes as first argument the level and a boolean for the numbering. The second argument contains the formatted number (if numbered) and the destination.

```
\NewTaggingSocketPlug{sec/title/runin/number}{kernel}
 {
   \__tag_sec_title_runin_number:nNn #1 {#2}
 }
\AssignTaggingSocketPlug{sec/title/runin/number}{kernel}
```

The following tagging socket command simply tags a number. It is not used here, as the legacy code needs a more complicated setup.

It takes the level as first argument. The second argument contains the formatted number.

```
\NewTaggingSocketPlug{sec/title/number}{kernel}
 {
   \tag_mc_end_push:
```

```
    \tag_struct_begin:n{tag=\UseStructureName{sec/#1/number}}
    \tag_mc_begin:n{}
      #2
    \tag_mc_end:
    \tag_struct_end:
    \tag_mc_begin_pop:n{}
  }
\AssignTaggingSocketPlug{sec/title/number}{kernel}
```

Plugs for the heading commands inside minipages and parboxes:

```
\msg_new:nnn { tag } { heading-inside-box }
 {
   A~heading~with~level~#1~detected~in~a~minipage~or~parbox.\\
   Consider~closing~the~previous~`Sect`~with~\\
   \string\tagpdfsetup{sec/end=#1}~before~the~minipage~or~parbox
 }
\NewTaggingSocketPlug{sec/begin}{insidebox}
 {
   \seq_get:NN \g__tag_sec_stack_seq \l__tag_sec_tmpa_tl
    \int_compare:nNnT
      {\l__head_level_int}<{\exp_last_unbraced:NV\use_ii:nnn\l__tag_sec_tmpa_tl +1}
      {
       \msg_warning:nne { tag }{heading-inside-box}{\int_use:N\l__head_level_int}
      }
 }
\NewTaggingSocketPlug{sec/end}{insidebox}
 {}
```

# 6 Heading commands

## 6.1 \part and \chapter

`\part` and `\chapter` are defined by the classes. To tag them we redefine the user commands. This will probably break with various classes and with titlesec. The tagging inside relies on the para tagging. We do not yet use keyval in the optional argument, as this requires latex-dev and the naming of the keys and their key family is unclear.

### 6.1.1 Hyperref code

Package hyperref has to insert anchors. If the heading is numbered this is done by `\refstepcounter` (and so in vmode). For unnumbered headings hyperref injects the anchor in hmode before the text, it also inserts a kern to compensate the indent.

This means that the target of numbered and unnumbered sectioning commands differ, both regarding the location and in relation to the tagging structure: The anchor from the `\refstepcounter` is outside of the structure created by the heading title if the para tags are used, while the other anchors are inside and so the structure destinations are different.

## 6.2 Adaption of the heading commands

## 6.3 Keys for \tagpdfsetup

We need to provide user and package level commands

```
\keys_define:nn{__tag / setup}
 {
   ,sec/end .code:n =
      {
        \par
        \UseTaggingSocket{sec/end}{\int_eval:n{\cs_if_exist_use:c{toclevel@#1}+0}}
      }
   ,sec/end .value_required:n = true
   ,sec/grouping .choice:,
   ,sec/grouping / true .code:n =
     {
       \AssignTaggingSocketPlug{sec/begin}{kernel}
       \AssignTaggingSocketPlug{sec/end}{kernel}
     }
   ,sec/grouping / false .code:n =
     {
       \AssignTaggingSocketPlug{sec/begin}{noop}
       \AssignTaggingSocketPlug{sec/end}{noop}
     }
   ,sec/grouping .default:n = true
 }
```

⟨/package⟩