

The l3flag package: expandable flags*

The L^AT_EX3 Project[†]

Released 2011/12/08

Flags are the only data-type on which T_EX can perform assignments in expansion-only contexts. This module is meant mostly for kernel use: in almost all cases, booleans or integers should be preferred to flags, because they are faster.

A flag can hold any non-negative value, which we call its *height*. In expansion-only contexts, a flag can only be “raised”: this normally increases the *height* by 1, but can be configured by defining specific traps. The *height* can also be queried expandably. However, decreasing it, or setting it to zero requires non-expandable assignments.

Flag variables are always local. They are referenced by a *name* of the form *package_flag name*, for instance, `str_missing`.

1 Setting up flags

| | |
|--------------------------|--|
| <code>\flag_new:n</code> | <code>\flag_new:n {<flag name>}</code> |
|--------------------------|--|

Creates a new *flag* with a name given by *flag name*, or raises an error if the name is already taken. The *flag name* must consist of character tokens only. The declaration is global, but flags are always local variables. The *flag* will initially have zero height.

| | |
|----------------------------|--|
| <code>\flag_clear:n</code> | <code>\flag_clear:n {<flag name>}</code> |
|----------------------------|--|

The *flag*’s height is set to zero. The assignment is local.

| | |
|--------------------------------|--|
| <code>\flag_clear_new:n</code> | <code>\flag_clear_new:n {<flag name>}</code> |
|--------------------------------|--|

Ensures that the *flag* exists globally by applying `\flag_new:n` if necessary, then applies `\flag_zero:n`, setting the height to zero locally.

| | |
|--------------------------------|--|
| <code>\flag_set_trap:nn</code> | <code>\flag_set_trap:nn {<flag name>} {<inline function>}</code> |
|--------------------------------|--|

Changes the action that is taken when the *flag* is raised using `\flag_raise:n`. Instead of the default action which is to increase the *flag*’s height by 1, the *inline function* will be called, receiving the current flag’s height as `#1`. The *inline function* should expand to nothing; *e.g.*, it could call `\msg_expandable_error:n`. This function is very experimental.

*This file describes v3039, last revised 2011/12/08.

[†]E-mail: latex-team@latex-project.org

2 Expandable flag commands

| | |
|--|---|
| <hr/> <code>\flag_if_exist_p:n</code> ★ | <code>\flag_if_exist:n {⟨flag name⟩}</code> |
| <code>\flag_if_exist:nTF</code> ★ | This function returns <code>true</code> if the <code>⟨flag name⟩</code> references a flag that has been defined previously, and <code>false</code> otherwise. |
| <hr/> <code>\flag_if_raised_p:n</code> ★ | <code>\flag_if_raised:n {⟨flag name⟩}</code> |
| <code>\flag_if_raised:nTF</code> ★ | This function returns <code>true</code> if the <code>⟨flag⟩</code> has non-zero height, and <code>false</code> if the <code>⟨flag⟩</code> has zero height. |
| <hr/> <code>\flag_height:n</code> ★ | <code>\flag_height:n {⟨flag name⟩}</code> |
| | Expands to the height of the <code>⟨flag⟩</code> as an integer denotation. |
| <hr/> <code>\flag_raise:n</code> ★ | <code>\flag_raise:n {⟨flag name⟩}</code> |
| | The <code>⟨flag⟩</code> 's trap is performed, taking the current height as its argument. The default behaviour is to increase the <code>⟨flag⟩</code> 's height by 1 locally. This function is expandable, as long as the trap is expandable (the default trap is expandable, despite being an assignment). |

3 l3flag implementation

```

1 ⟨*initex | package⟩
2 ⟨@@=flag⟩
3 \ProvidesExplPackage
4   {⟨ExplFileName⟩}{⟨ExplFileDate⟩}{⟨ExplFileVersion⟩}{⟨ExplFileDescription⟩}

```

3.1 Non-expandable flag commands

`\flag_new:n` For each flag, we define a “trap” function, which by default simply increases the flag by 1.

```

5 \cs_new_protected:Npn \flag_new:n #1
6 {
7   \cs_new:cpn { __flag_trap_#1:w } ##1 ;
8   { \exp_after:wN \use_none:n \cs:w __flag_#1_##1: \cs_end: }
9 }

```

(End definition for `\flag_new:n`. This function is documented on page 1.)

`\flag_clear:n` `__flag_clear:ww` Undefined control sequences, starting from the `_0` flag, upwards, until reaching an undefined control sequence.

```

10 \cs_new_protected:Npn \flag_clear:n #1
11 { \__flag_clear:ww 0 ; #1 \q_stop }
12 \cs_new_protected:Npn \__flag_clear:ww #1 ; #2 \q_stop
13 {
14   \if_cs_exist:w __flag_#2_#1: \cs_end:

```

```

15     \else:
16         \exp_after:wN \use_none_delimit_by_q_stop:w
17     \fi:
18     \cs_set_eq:cN { __flag_#2_#1: } \tex_undefined:D
19     \exp_after:wN \__flag_clear:ww
20     \int_use:N \__int_eval:w \c_one + #1 ;
21     #2 \q_stop
22 }

```

(End definition for `\flag_clear:n`. This function is documented on page 1.)

`\flag_clear_new:n` As for other datatypes, clear the $\langle flag \rangle$ or create a new one, as appropriate.

```

23 \cs_new_protected:Npn \flag_clear_new:n #1
24 { \flag_if_exist:nTF {#1} { \flag_clear:n } { \flag_new:n } {#1} }

```

(End definition for `\flag_clear_new:n`. This function is documented on page 1.)

`\flag_set_trap:nn` Redefine the trap.

```

25 \cs_new_protected:Npn \flag_set_trap:nn #1#2
26 { \cs_set:cpn { __flag_trap_#1:w } ##1 ; {#2} }

```

(End definition for `\flag_set_trap:nn`. This function is documented on page 1.)

3.2 Expandable flag commands

`\flag_if_exist_p:n` A flag exist if the corresponding trap `__flag_trap_⟨flag name⟩:n` is defined.

`\flag_if_exist:nTF`

```

27 \prg_new_conditional:Npnn \flag_if_exist:n #1 { p , T , F , TF }
28 {
29     \cs_if_exist:cTF { __flag_trap_#1:w }
30     { \prg_return_true: } { \prg_return_false: }
31 }

```

(End definition for `\flag_if_exist:n`. These functions are documented on page 2.)

`\flag_if_raised_p:n` Test if the flag is non-zero, by checking the `_0` control sequence.

`\flag_if_raised:nTF`

```

32 \prg_new_conditional:Npnn \flag_if_raised:n #1 { p , T , F , TF }
33 {
34     \if_cs_exist:w __flag_#1_0: \cs_end:
35     \prg_return_true:
36     \else:
37     \prg_return_false:
38     \fi:
39 }

```

(End definition for `\flag_if_raised:n`. These functions are documented on page 2.)

`\flag_height:n` Extract the value of the flag by going through all of the $\langle integer \rangle$ control sequences starting from 0.

`__flag_height_loop:ww`

`__flag_height_end:ww`

```

40 \cs_new:Npn \flag_height:n #1 { \__flag_height_loop:ww 0; #1 \q_stop }
41 \cs_new:Npn \__flag_height_loop:ww #1 ; #2 \q_stop
42 {
43     \if_cs_exist:w __flag_#2_#1: \cs_end:
44     \exp_after:wN \__flag_height_loop:ww \int_use:N \__int_eval:w \c_one +

```

```

45     \else:
46         \exp_after:wN \__flag_height_end:ww
47     \fi:
48     #1 ; #2 \q_stop
49 }
50 \cs_new:Npn \__flag_height_end:ww #1 ; #2 \q_stop { #1 }
(End definition for \flag_height:n. This function is documented on page 2.)

\flag_raise:n Simply apply the trap to the height, after expanding the latter.
51 \cs_new:Npn \flag_raise:n #1
52 {
53     \cs:w \__flag_trap_#1:w \exp_after:wN \cs_end:
54     \__int_value:w \flag_height:n {#1} ;
55 }
(End definition for \flag_raise:n. This function is documented on page 2.)
56 </initex | package>

```

Index

The italic numbers denote the pages where the corresponding entry is described, numbers underlined point to the definition, all others indicate the places where it is used.

| Symbols | | \ExplFileVersion 4 |
|----------------------------------|--------------------------------|--|
| __flag_clear:ww | <u>10</u> , 11, 12, 19 | |
| __flag_height_end:ww | <u>40</u> , 46, 50 | |
| __flag_height_loop:ww | <u>40</u> , <u>40</u> , 41, 44 | |
| __int_eval:w | 20, <u>44</u> | |
| __int_value:w | 54 | |
| C | | F |
| \c_one | 20, 44 | |
| \cs:w | 8, 53 | |
| \cs_end: | 8, 14, 34, 43, 53 | |
| \cs_if_exist:cTF | 29 | \fi: 17, 38, 47 |
| \cs_new:cpn | 7 | \flag_clear:n <u>1</u> , <u>10</u> , 10, 24 |
| \cs_new:Npn | 40, 41, 50, 51 | \flag_clear_new:n <u>1</u> , <u>23</u> , 23 |
| \cs_new_protected:Npn | 5, 10, 12, 23, 25 | \flag_height:n <u>2</u> , <u>40</u> , 40, 54 |
| \cs_set:cpn | 26 | \flag_if_exist:n 27 |
| \cs_set_eq:cN | 18 | \flag_if_exist:nTF <u>2</u> , 24, <u>27</u> |
| E | | \flag_if_exist_p:n <u>2</u> , <u>27</u> |
| \else: | 15, 36, 45 | \flag_if_raised:n 32 |
| \exp_after:wN | 8, 16, 19, 44, 46, 53 | \flag_if_raised:nTF <u>2</u> , 32 |
| \ExplFileDate | 4 | \flag_if_raised_p:n <u>2</u> , 32 |
| \ExplFileDescription | 4 | \flag_new:n <u>1</u> , <u>5</u> , 5, 24 |
| \ExplFileName | 4 | \flag_raise:n <u>2</u> , <u>51</u> , 51 |
| | | \flag_set_trap:nn <u>1</u> , <u>25</u> , 25 |
| | | I |
| | | \if_cs_exist:w 14, 34, 43 |
| | | \int_use:N 20, 44 |
| | | P |
| | | \prg_new_conditional:Npnn 27, 32 |
| | | \prg_return_false: 30, 37 |

| | | | | | |
|-----------------------------------|-------|----------------------------|--|-------|----------|
| <code>\prg_return_true:</code> | | 30, 35 | | | T |
| <code>\ProvidesExplPackage</code> | | 3 | <code>\tex_undefined:D</code> | | 18 |
| | | | | | U |
| | | | Q | | |
| | | | <code>\use_none:n</code> | | 8 |
| <code>\q_stop</code> | | 11, 12, 21, 40, 41, 48, 50 | <code>\use_none_delimit_by_q_stop:w</code> | | 16 |