

The `xpatch` package

Extending `etoolbox` patching commands*

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1 Introduction

The well known `etoolbox` package provides a bunch of functions for patching existing commands; in particular `\patchcmd`, `\pretocmd` and `\apptocmd` that do a wonderful job, but suffer from a limitation: if some package has defined

```
\newcommand{\xyz}[1][x]{-#1!}
```

where `\xyz` has an optional argument, then `\patchcmd` and siblings cannot be used to modify the workings of `\xyz`. The same happens when a command has been defined with `\DeclareRobustCommand`.

The reason for this is \TeX nical or, better, \LaTeX nical. When \LaTeX performs the above definition, the expansion of `\xyz` will be

```
\@protected@testopt \xyz \xyz {x}
```

where `\@protected@testopt` is a macro that essentially checks whether we are in a “protected” context, so that expansion should not be performed all the way (in moving arguments or write operations), or not; in the former case it issues a protected version of `\xyz`, while in the latter case it expands the macro `\xyz` that is a *single* command (yes, with a backslash in its name) which contains the real definition; a way to access this definition is to issue the command

```
\expandafter\show\csname\string\xyz\endcsname
```

which will print in the log file the message

```
> \xyz=\long macro:
[#1]->-#1!.
```

As usual, after `->` we see the definition. In order to use `\patchcmd` to change the exclamation mark into a hyphen one must do

```
\expandafter\patchcmd\csname\string\xyz\endcsname{!}{-}{-}{}{}
```

(see the documentation of `etoolbox` for details about the arguments).

A similar situation happens if `\xyz` has been defined by

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```
\DeclareRobustCommand{\xyz}{something}
```

A `\show\xyz` would show the cryptic

```
> \xyz=macro:
->\protect \xyz .
```

and only a close look reveals the clever trick used by the \LaTeX team: the `\protect` is not applied to `\xyz`, but to the macro `\xyz_` which has a space at the end of its name! And this macro is the one that contains the real definition. Indeed,

```
\expandafter\show\csname xyz\space\endcsname
```

produces the message

```
> \xyz =\long macro:
->something.
```

In this case, in order to apply `\patchcmd` we must say

```
\expandafter\patchcmd\csname xyz\space\endcsname{s}{S}{}{}
```

If the macro with `\DeclareRobustCommand` is defined to have an optional argument, say

```
\DeclareRobustCommand{\xyz}[1][x]{-#1!}
```

one has to combine the two tricks:

```
\expandafter\patchcmd\csname\string\xyz\space\endcsname{!}{-}{}{}
```

It's hard and error prone to remember all of these tricks, so this package comes to the rescue.

Caveat

This package is still in a preliminary version, but relevant changes to the interface should not be introduced in later versions. A “verbose” mode is under testing, which will provide at request more information about the nature of the command to be patched.

2 Commands

The commands introduced by this package are

- `\xpatchcmd`
- `\xpretocmd`
- `\xapptocmd`

which have the same syntax as the similar commands provided by `etoolbox` and apply to all kind of commands defined by

- the \LaTeX kernel macros `\newcommand`, `\renewcommand`, `\providecommand`, but also `\newenvironment` and `\renewenvironment`;
- the \LaTeX kernel macro for defining robust commands `\DeclareRobustCommand`;

- the etoolbox macros `\newrobustcmd`, `\renewrobustcmd`, `\providerobustcmd`.

Notice that patching the definition of the environment `foo` requires patching `\foo` or `\endfoo`.

These commands will act as the original ones if the macro to patch is not robust or with optional arguments.

Moreover the package defines

- `\xpatchbibmacro`
- `\xpretobibmacro`
- `\xapptobibmacro`

that can be used to patch commands defined with biblatex's `\newbibmacro`. Say that we have

```
\newbibmacro{foo.bar}[2]{#1 and #2}
```

Then, to change `and` into `und`, we can now say

```
\xpatchbibmacro{foo.bar}{and}{und}{}{}
```

Patching these macros requires resorting to the *very* cryptic

```
\expandafter\patchcmd\csname abx@macro@\detokenize{foo.bar}\endcsname
{and}{und}{}{}
```

that would become an astonishing

```
\expandafter\patchcmd\csname\expandafter\string\csname
abx@macro@\detokenize{foo.bar}\endcsname\endcsname
{and}{und}{}{}
```

if the original definition had been with an optional argument, say

```
\newbibmacro{foo.bar}[2][x]{#1 and #2}
```

For biblatex users there are also

- `\xpatchbibdriver`
- `\xpretobibdriver`
- `\xapptobibdriver`

for patching commands defined with `\DeclareBibliographyDriver`. One could use, for patching the driver `foo`,

```
\makeatletter
\patchcmd{\blx@bbx@foo}{X}{Y}{success}{failure}
\preto{\blx@bbx@foo}{P}
\appto{\blx@bbx@foo}{A}
\makeatother
```

but having a lighter interface can be handy. Since our macros use `\pretocmd` and `\apptocmd` for consistency, remember to always use the `{success}` and `{failure}` arguments also with `\xpretobibdriver` and `\xapptobibdriver`.

Finally, the package defines the commands

- `\xshowcmd`

- `\xshowbibmacro`
- `\xshowbibdriver`

that are the analog of `\show` to see the “real” definition of a macro, be it defined with optional arguments or as a robust command; the `bib` ones are for the corresponding biblatex macros.

3 Using the original commands

The original `\patchcmd` has still its use: suppose you want to modify the default for the optional argument passed to a macro: if the original definition is

```
\newcommand{\xyz}[1][x]{-#1!}
```

then one can say

```
\patchcmd{\xyz}{x}{y}{}{}
```

because of the way `\xyz` is defined, as shown before.

4 Syntax

```
\xpatchcmd{<command>}{<search>}{<replace>}{<success>}{<failure>}
\xpretocmd{<command>}{<prepend>}{<success>}{<failure>}
\xapptocmd{<command>}{<append>}{<success>}{<failure>}

\xpatchbibmacro{<name>}{<search>}{<replace>}{<success>}{<failure>}
\xpretobibmacro{<name>}{<prepend>}{<success>}{<failure>}
\xapptobibmacro{<name>}{<append>}{<success>}{<failure>}

\xpatchbibdriver{<name>}{<search>}{<replace>}{<success>}{<failure>}
\xpretobibdriver{<name>}{<prepend>}{<success>}{<failure>}
\xapptobibdriver{<name>}{<append>}{<success>}{<failure>}

\xshowcmd{<command>}
\xshowbibname{<name>}
\xshowbibdriver{<name>}
```

Here `<command>` is the command’s name (with the backslash), while `<name>` is the string that appears as the argument to `\newbibmacro` or `\DeclareBibliographyDriver` respectively; `<search>`, `<replace>`, `<prepend>` and `<append>` are the list of tokens that are to be used for the specific tasks; `<success>` and `<failure>` are token lists to be executed if the patching succeeds or fails respectively. I find it useful to use `\ddt` as `<failure>`, so that \TeX will stop for the undefined control sequence when the patching fails.

It’s important to remember that patching commands that have `@`-commands in their replacement text must always be performed between `\makeatletter` and `\makeatother`.

5 Limitations and warnings

Macros defined in devious ways might trick `\xpatchcmd` and siblings, although many precautions have been taken in order this not to happen. Always check with care.

Remember that one must *never* use the old trick

```
\let\ORIxyx\xyz
\renewcommand{\xyz}[1][x]{+\ORIxyz[#1]?}
```

if `\xyz` had been defined with an optional argument. For such things it's better to use `\xpatchcmd` and friends or employ the `letltxmacro` package by H. Oberdiek, that provides `\LetLtxMacro` for purposes like this.

Although this package has been written with the experimental L^AT_EX3 macros, the commands *can't* be used to patch commands defined with the `xparse` interface, in general.

If a command appears to have one optional argument at the user level, this doesn't mean it has been defined with `\newcommand` directly. One should always check the definitions with `\show` and `\xshowcmd` before trying a patch: of course one has to know what a command does, in order to patch it. And, when first testing the patch, it's best to set `\tracingpatches`.

6 History

Version 0.1 First public release.

Version 0.2 Added `\...bibdriver` macros; fixed a bug for control symbols defined with `\newcommand` and an optional argument.

7 The implementation of xpatch

```
1 \ProvidesExplPackage
2   {\ExplFileName}{\ExplFileDate}{\ExplFileVersion}{\ExplFileDescription}
3
4   A check to make sure that expl3 is not too old
5   \@ifpackagelater { expl3 } { 2011/10/09 }
6   {
7     \PackageError { xpatch } { Support~package~l3kernel~too~old. }
8     {
9       Please~install~an~up~to~date~version~of~l3kernel~
10      using~your~TeX~package~manager~or~from~CTAN.\\ \\
11      Loading~xpatch~will~abort!
12    }
13  }
14  \tex_endinput:D
15 }
```

The `xparse` and `etoolbox` packages are required.

```
14 \RequirePackage{xparse,etoolbox}
```

7.1 Utilities, variables and constants

Generate a variant of `\tl_if_in:NnT` to get the expanded second argument.

```
15 \cs_generate_variant:Nn \tl_if_in:NnT { Nx }
```

A boolean for the testing of robust commands.

```
16 \bool_new:N \l_xpatch_protect_bool
```

The constant `\c_backslash_str` is defined in `l3str` that’s not loaded at the moment, so we save a bit of memory not loading it.

```
17 \cs_if_exist:NF \c_backslash_str
18 { \tl_const:Nx \c_backslash_str { \cs_to_str:N \ } }
```

A “bizarre” token list that’s quite improbable to find in the replacement text of a macro.

```
19 \tl_const:Nx \c_xpatch_bizarre_tl
20 { \tl_to_str:n { **)-(/**/)**-[** ] }
```

7.2 The main functions

The main function takes as first argument one of `\patchcmd`, `\pretocmd` or `\apptocmd`; the second argument is the command we want to patch.

Some technical remarks. Suppose we have the following definitions:

```
\DeclareRobustCommand{\xaa}[1]{xaa (DeclareRobustCommand-noopt)}
\DeclareRobustCommand{\xab}[1][x]{xab (DeclareRobustCommand-opt)}
\newcommand{\xac}[1][ ]{xac (newcommand-opt)}
\newrobustcmd\xad[1][ ]{xad (newrobustcmd-opt)}
\DeclareRobustCommand{\1}[1]{1 (DeclareRobustCommand-noopt)}
\DeclareRobustCommand{\2}[1][ ]{2 (DeclareRobustCommand-opt)}
\newcommand{\3}[1][ ]{3 (newcommand-opt)}
\newrobustcmd\4[1][ ]{4 (newrobustcmd-opt)}
```

Then the first level expansions are, respectively,

```
+ \protect_\xaa_\_+
+ \protect_\xab_\_+
+ \@protected@testopt_\xac_\ \xac_{}+
+ \@testopt_\ \xad_{}+
+ \x@protect_\1\protect_\1_\_+
+ \x@protect_\2\protect_\2_\_+
+ \@protected@testopt_\3_\3_{}+
+ \@testopt_\4_\_{}+
```

where the `+` is used to delimit the expansions and show the spaces. Remember that `\show` always adds a space after a control word, but not after a control symbol such as `\1`. However, in lines 5 and 6, `\1_` is not a control symbol any more. So we have to take care of `\protect`, `\x@protect`, `\@protected@testopt` and `\@testopt`. But it’s not simply sufficient to check for the presence of such a token at the start of the replacement text, or we’ll be confused by macros such as `\linebreak`, whose replacement text starts with `\@testopt`. So we’ll check also for the presence of the subsequent tokens, that depend on the macro’s name. We add a perhaps useless “random” string at the beginning, as we’d like to ensure that the matches are exactly at the start of the replacement text.

```
21 \cs_new:Npn \xpatch_main:NN #1 #2
22 {
```

We initialize the boolean to false.

```
23 \bool_set_false:N \l_xpatch_protect_bool
```

First of all we store the command-to-patch name.

```
24 \tl_set:Nx \l_xpatch_name_tl { \cs_to_str:N #2 }
```

We store the replacement text of the command-to-patch, but adding the bizarre token list in front of it which consists of all category 12 characters, just to be sure that the matches are at the beginning.¹

```

25 \tl_set:Nx \l_xpatch_repl_tl
26 { \c_xpatch_bizarre_tl \token_get_replacement_spec:N #2 }

```

We look whether the token list contains the bizarre list followed by `\protect` and the same name (with two spaces) which happens if #2 is a control sequence defined by `\DeclareRobustCommand`, so we add a space to the command name.

```

27 \tl_if_in:NxT \l_xpatch_repl_tl
28 {
29   \c_xpatch_bizarre_tl
30   \token_to_str:N \protect \c_space_tl
31   \c_backslash_str \l_xpatch_name_tl \c_space_tl \c_space_tl
32 }
33 {
34   \bool_set_true:N \l_xpatch_protect_bool
35   \tl_put_right:Nn \l_xpatch_name_tl { \c_space_tl }
36 }

```

We look whether the token list contains the bizarre list followed by `\x@protect` which happens if #2 is a control symbol defined by `\DeclareRobustCommand`, so we add a space to the command name.

```

37 \tl_if_in:NxT \l_xpatch_repl_tl
38 {
39   \c_xpatch_bizarre_tl
40   \token_to_str:N \x@protect \c_space_tl
41   \c_backslash_str \l_xpatch_name_tl \c_backslash_str
42 }
43 {
44   \bool_set_true:N \l_xpatch_protect_bool
45   \tl_put_right:Nn \l_xpatch_name_tl { \c_space_tl }
46 }

```

In both the preceding cases we have to do another check, so we set a boolean to true.

We look whether the token list contains the bizarre list followed by `\@protected@testopt` which happens if #2 is a control word with an optional argument (from `\newcommand`).

```

47 \tl_if_in:NxT \l_xpatch_repl_tl
48 {
49   \c_xpatch_bizarre_tl
50   \@protected@testopt \c_space_tl
51   \c_backslash_str \l_xpatch_name_tl
52   \c_space_tl \c_backslash_str \c_backslash_str
53 }
54 {
55   \tl_put_left:Nn \l_xpatch_name_tl { \c_backslash_str }
56 }

```

```

57 % We look whether the token list contains the bizarre list followed by
58 % |\@protected@testopt| which happens if |#2| is a control symbol with an
59 % optional argument (from |\newcommand|).
60 % \begin{macrocode}
61 \tl_if_in:NxT \l_xpatch_repl_tl
62 {

```

¹This part will be reimplemented as soon as `l3regex` stabilizes.

```

63     \c_xpatch_bizarre_tl
64     \token_to_str:N \@protected@testopt \c_space_tl
65     \c_backslash_str \l_xpatch_name_tl
66     \c_backslash_str \c_backslash_str
67   }
68   {
69     \tl_put_left:Nn \l_xpatch_name_tl { \c_backslash_str }
70   }

```

We look whether the token list contains the bizarre list followed by \@testopt which happens if #2 is a command with an optional argument (from \newrobustcmd).

```

71   \tl_if_in:NxT \l_xpatch_repl_tl
72   {
73     \c_xpatch_bizarre_tl
74     \token_to_str:N \@testopt \c_space_tl
75     \c_backslash_str \c_backslash_str \l_xpatch_name_tl
76   }
77   {
78     \tl_put_left:Nn \l_xpatch_name_tl { \c_backslash_str }
79   }

```

In both the preceding cases, we add a backslash in front of the command's name.

If the command-to-patch was defined by \DeclareRobustCommand we have to do another test, to check whether it has an optional argument and, in this case, we add a backslash in front of the name. We replicate the test for \@protected@testopt.

```

80   \bool_if:NT \l_xpatch_protect_bool
81   {
82     \tl_set:Nx \l_xpatch_repl_tl
83     { \c_xpatch_bizarre_tl
84       \exp_after:wN \token_get_replacement_spec:N
85       \cs:w \l_xpatch_name_tl \cs_end: }
86     \tl_if_in:NxT \l_xpatch_repl_tl
87     {
88       \c_xpatch_bizarre_tl
89       \token_to_str:N \@protected@testopt \c_space_tl
90       \c_backslash_str \l_xpatch_name_tl
91       \c_space_tl \c_backslash_str \c_backslash_str
92     }
93     {
94       \tl_put_left:Nn \l_xpatch_name_tl { \c_backslash_str }
95     }
96   }

```

Finally, we pass the real command-to-patch name to the patching macro.

```

97   \exp_after:wN #1 \cs:w \l_xpatch_name_tl \cs_end:

```

That's the last operation!

```

98   }

```

7.3 User level commands

The user level commands.

```

99 \NewDocumentCommand{\xpatchcmd}{*}{ \xpatch_main:NN \patchcmd }
100 \NewDocumentCommand{\xpretocmd}{*}{ \xpatch_main:NN \pretocmd }
101 \NewDocumentCommand{\xapptocmd}{*}{ \xpatch_main:NN \apptocmd }

```



```
102 \NewDocumentCommand{\xshowcmd} {}{\xpatch_main:NN \show }
```

We generate a variant of `\xpatch_main:NN` to accept a macro's name as its second argument.

```
103 \cs_generate_variant:Nn \xpatch_main:NN { Nc }
```

Now we can define the patching macros for `\newbibmacro` defined commands. In case one uses a wrong name, it will remain in the hash space, but it shouldn't be a problem: `\tracingpatches` must be used when testing, and it will warn about an undefined macro or one equivalent to `\relax`.

```
104 \NewDocumentCommand{\xpatchbibmacro} { m }
105   { \xpatch_main:Nc \patchcmd { abx@macro@ \tl_to_str:n {#1} } }
106 \NewDocumentCommand{\xpretobibmacro} { m }
107   { \xpatch_main:Nc \pretocmd { abx@macro@ \tl_to_str:n {#1} } }
108 \NewDocumentCommand{\xapptobibmacro} { m }
109   { \xpatch_main:Nc \apptocmd { abx@macro@ \tl_to_str:n {#1} } }
110 \NewDocumentCommand{\xshowbibmacro} { m }
111   { \xpatch_main:Nc \show { abx@macro@ \tl_to_str:n {#1} } }
```

Finally, the patching macros for biblatex drivers that don't need the overhead of `\xpatch_main:NN`.

```
112 \NewDocumentCommand{\xpatchbibdriver} { m }
113   { \exp_args:Nc \patchcmd {blx@bbx@#1} }
114 \NewDocumentCommand{\xpretobibdriver} { m }
115   { \exp_args:Nc \pretocmd {blx@bbx@#1} }
116 \NewDocumentCommand{\xapptobibdriver} { m }
117   { \exp_args:Nc \apptocmd {blx@bbx@#1} }
118 \NewDocumentCommand{\xshowbibdriver} { m }
119   { \exp_args:Nc \show {blx@bbx@#1} }
```

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