The regstats package

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Abstract

This LaTeX package allows to count the number of used registers (counter, dimen, skip, muskip, box, token, input, output, math families, languages, insertions) and compare these to the maximum available number of such registers. The time needed for a compilation run can be announced.

Contents

1 Introduction

This LaTeX package allows to count the number of used registers (counter, dimen, skip, muskip, box, token, input, output, math families, languages, insertions). Therefore the according `\count` is read. While `\count10` should be the number of the counters, `\count11` the one of the dimens, and so on, if there is enough room for another register of that type, then a new one of that register is used and looked at `\the\allocationnumber`. The result for each register is compared to the maximum available number of the respective register.
With option `left` additionally the number of remaining registers of each type is given, and with option `timer` the time needed for the compilation run (when either LuaLaTeX with `\directlua{starttime = os.clock()}` before `\documentclass` or `pdf(la)tex` is used).

2 Usage

Just load the package placing

```
\usepackage[<options>]{regstats}
```

at the end of the preamble of your LaTeX 2$_\varepsilon$ source file. When you load packages `\AtBeginDocument`, `regstats` should be the last one of those packages. The resulting message will be presented at the end of the compilation messages at the screen and in the `log` file.

The examplefile provides (commented out) `\stressCounter`, `\stressDimen`, . . . , and `\stressInsert` to try out how many counters, dimens, . . . , and inserts your system can handle.

2.1 Options

options The regstats package takes the following options:

2.1.1 left

left When option `left` (or `left=true`) is chosen, also the number of remaining registers of each type is given. The default is `left=false`.

2.1.2 timer

timer When option `timer` (or `timer=true`) is chosen, also the time needed for the compilation run is given. The default is `timer=false`. The used `\pdfelapsedtime` is not available, when LuaLaTeX is used instead of `pdf(la)tex` to compile the document. In that case at the very beginning of your `tex` file say
`\directlua{starttime = os.clock()}`
(even before `\documentclass`!), and then the `timer` option can also be used with LuaLaTeX. When neither LuaLaTeX nor pdfLaTeX is used to compile the document, the `timer`(-option) does not work.

2.1.3 proof

proof Option `proof` is **obsolete** and should no longer be used.

3 Alternatives

- regcount, 1999/08/03, v1.0, by Jean-Pierre F. Drucbert (†), provides the command `\rgcounts`, which can write the numbers of used registers into the `log` file anywhere (not only at the end) and does this automatically `\AtBeginDocument` and `\AtEndDocument`. The given number of allocated insertions is *wrong*, because these are not numbered 0, 1, 2..., but start at a high number, which is then decreased (and additionally there are jumps, see p. 16). The package is compatible with the regstats package (i. e. you can use both packages at the same time in one document) and available at https://ctan.org/pkg/regcount.

- One can manually search for the last appearance of `\count`, `\dimen`, `\skip`, `\muskip`, `\box`, `\toks`, `\read` (input), `\write` (output), `\mathgroup` (math family), and `\language`, and find the according number there. This does not provide any information about the number of remaining registers, of course. And it does not work for `\insert`, see p. 16).

You programmed or found another alternative, which is available at https://www.CTAN.org/? OK, send an e-mail to me with the name, location at CTAN, and a short notice, and I will probably include it in the list above.

4 Example

```
⟨*example⟩
%% When compiling with LuaLaTeX (and wanting to use option timer=true),
%% the following line must be uncommented (i.e. remove the "%% ").
%% \directlua{starttime = os.clock()}
\documentclass[british]{article}
\usepackage[left=true,timer=true]{regstats}[2025/01/28]% v1.1b Counting used registers (HMM)
\ifpdf\ifluatex\else
\pdfinfo{
  /Author (H.-Martin Muench)
  /Title (regstats package example)
  /Subject (Example for the regstats package)
  /Keywords (LaTeX;registers;read;write;language;box;dimen;count;toks;muskip;skip;counter;regstats)
}
\fi\fi
%% If you use the hyperref package, use the options of that package
%% to set the pdf information.
%% Do NOT use \pdfinfo AND the hyperref package!

%%\usepackage{etex}
%%\usepackage{morewrites}

\makeatletter
\newcommand{\stressCounter}[1]{%
  \ifnum\the\count10<#1\relax\else\message{Already \the\count10 \space counters used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count10<#1\do%
    {\advance\@tempcnta +1\relax%
     \newcounter{TestCounter\the\@tempcnta} \message{counter \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressDimen}[1]{%
  \ifnum\the\count11<#1\relax\else\message{Already \the\count11 \space dimens used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count11<#1\do%
    {\advance\@tempcnta +1\relax%
     \expandafter\newdimen\csname TestDimen\the\@tempcnta\endcsname \message{dimen \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressSkip}[1]{\%
  \ifnum\the\count12<#1\relax\else\message{Already \the\count11 \space skips used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count12<#1\do%
```

```
    {\advance\@tempcnta +1\relax%
     \expandafter\newskip\csname TestSkip\the\@tempcnta\endcsname \message{skip \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressMuskip}[1]{%
  \ifnum\the\count13<#1\relax\else\message{Already \the\count11 \space muskips used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count13<#1\do%
    {\advance\@tempcnta +1\relax%
     \expandafter\newmuskip\csname TestMuskip\the\@tempcnta\endcsname \message{muskip \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressBox}[1]{%
  \ifnum\the\count14<#1\relax\else\message{Already \the\count11 \space boxes used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count14<#1\do%
    {\advance\@tempcnta +1\relax%
     \expandafter\newbox\csname TestBox\the\@tempcnta\endcsname \message{box \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressToks}[1]{%
  \ifnum\the\count15<#1\relax\else\message{Already \the\count11 \space toks used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count15<#1\do%
    {\advance\@tempcnta +1\relax%
     \expandafter\newtoks\csname TestToks\the\@tempcnta\endcsname \message{toks \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressRead}[1]{%
  \ifnum\the\count16<#1\relax\else\message{Already \the\count11 \space reads used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count16<#1\do%
    {\advance\@tempcnta +1\relax%
     \expandafter\newread\csname TestRead\the\@tempcnta\endcsname \message{read \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressWrite}[1]{%
  \ifnum\the\count17<#1\relax\else\message{Already \the\count11 \space writes used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count17<#1\do%
    {\advance\@tempcnta +1\relax%
```

```
     \expandafter\newwrite\csname TestWrite\the\@tempcnta\endcsname \message{write \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressFam}[1]{%
  \ifnum\the\count18<#1\relax\else\message{Already \the\count11 \space fams used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count18<#1\do%
    {\advance\@tempcnta +1\relax%
     \expandafter\newfam\csname TestFam\the\@tempcnta\endcsname \message{fam \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressLanguage}[1]{%
  \ifnum\the\count19<#1\relax\else\message{Already \the\count11 \space languages used.} \fi%
  \@tempcnta=0\relax%
  \@whilenum\the\count19<#1\do%
    {\advance\@tempcnta +1\relax%
     \expandafter\newlanguage\csname TestLanguage\the\@tempcnta\endcsname \message{language \the\allocationnumber ^^J}%
    }%
  }

\newcommand{\stressInsert}[1]{%
 \message{Declaring #1\space ADDITIONAL inserts:}%
 \@tempcnta=0\relax%
 \@whilenum\the\@tempcnta<#1\do%
  {\advance\@tempcnta +1\relax%
   \expandafter\newinsert\csname TestInsert\the\@tempcnta\endcsname%
   \message{insert \the\@tempcnta: \the\allocationnumber^^J}%
  }%
 }
\makeatother

\listfiles
\begin{document}
\pagenumbering{arabic}
\section*{Example for regstats}

This example demonstrates the use of package\newline
\textsf{regstats}, v1.1b as of 2025-01-28.\newline
The used options were \texttt{left=true,timer=true}.\par
\texttt{left=false,timer=false} would be the defaults.\newline

Regarding the use of
\makeatletter%
\ \@ifundefined{eTeX}{\hbox{$\m@th \varepsilon $-\TeX}}{\eTeX}, %
```

```
\makeatother%
the \texttt{morewrite} package, the reservation of \texttt{insert}s,
and using more \texttt{math families} please see the documentation!\newline

For the resulting message, please compile \texttt{regstats-example.tex}
and have a look at the end of its \texttt{.log}-file.\newline

Because the compilation time for this example is usually quite short,
option \texttt{timer} is not demonstrated very spectacular.\newline

To test a register type for the number of available registers,
uncomment the respective line below and set the number to an interesting value.


\makeatletter
%%\stressCounter{233}
%%\stressDimen{233}
%%\stressSkip{233}
%%\stressMuskip{255}
%%\stressBox{233}
%%\stressToks{255}
%%\stressRead{15}
%%\stressWrite{14}
%%\stressFam{15}
%%\stressLanguage{255}
%%\stressInsert{20}
\makeatother

\end{document}
⟨/example⟩
```

5 The implementation

We start off by checking that we are loading into LaTeX 2ε and announcing the name and version of this package.

⟨*package⟩

```
\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{regstats}[2025/01/28 v1.1b Counting used registers (HMM)]

```

A short description of the regstats package:

```
%% Allows to count the number of used registers
%% (counter, dimen, skip, muskip, box, token, input, output,
%%  math families, languages, insertions)
%% and compare these to the maximum available number of such registers.

```

We need the kvoptions package:

```
\RequirePackage{kvoptions}% Key value format for package options (HO)

```

We process the options:

```
\SetupKeyvalOptions{family=regstats,prefix=regstats@}
\DeclareBoolOption{left}% \regstats@left
\DeclareBoolOption{timer}
\DeclareBoolOption{proof}% OBSOLETE

\ProcessKeyvalOptions*

```

Option `proof` is **obsolete**:

```
\ifregstats@proof
  \PackageWarningNoLine{regstats}{Option proof is obsolete. Please do not use it\MessageBreak%
    when loading the regstats package}
\else
  \PackageInfo{regstats}{Option proof is obsolete.\MessageBreak%
    If you used proof=false, please remove this\@gobble}
\fi

```

We need the iftex package (or its predecessors ifpdf, ifetex, and ifluatex):

```
\IfFileExists{iftex.sty}{\RequirePackage{iftex}}{
  \RequirePackage{ifpdf}
  \RequirePackage{ifetex}
  \RequirePackage{ifluatex}
  }

```

```
\@ifundefined{ifluatex}{\newif\ifluatex \luatexfalse}{\relax}
\@ifundefined{ifetex}{\newif\ifetex \etexfalse}{\relax}

```

Yes, if LuaLaTeX is used without defining `\ifluatex`, then we fail safe with assuming LuaLaTeX is not used. Otherwise everything (`\else`s and `\fi`s) gets mixed up, but LuaLaTeX without `\ifluatex` is really broken. Also if `\ifetex` is unknown, we assume that there is no ε-TeX available.

Option timer requires some condition:

```
\ifregstats@timer
  \ifpdf \RequirePackage{intcalc}
  \else \PackageError{regstats}{Option timer only works with pdf(la)tex\MessageBreak%
          and with lua(la)tex}{Neither appears to be used here.}
        \regstats@timerfalse
  \fi
\fi

```

The timer:

```
\newcommand{\regst@ts@timer}{\message{^^J}%
  \@tempcnta=0%
```

For LuaLaTeX:

```
  \ifluatex%
    \@tempcnta=%
      \directlua{
        if starttime then
          tex.sprint((os.clock()-starttime)*65536)
        else
          tex.sprint(0)
        end
       }\relax%
```

and for pdfLaTeX:

```
  \else \ifpdf \@tempcnta=\the\pdfelapsedtime\relax\fi%
  \fi%
```

Checking the result:

```
  \ifnum \the\@tempcnta = 0%
    \ifluatex%
      \PackageError{regstats}{Did you forget to start the timer?}{%
        Before \string\documentclass\space you need to say\MessageBreak%
        \string\directlua{starttime = os.clock()}}%
    \fi%
    \PackageError{regstats}{Could not determine the time used for compilation}{Reason is unknown.}%
  \else%
```

It worked!

```
    \xdef\regstatselapsedtime{\the\@tempcnta}%
    \divide \@tempcnta by 65536% scaled-seconds -> seconds
    \xdef\regstatsseconds{\the\@tempcnta}%
    \ifnum \regstatsseconds > 59%
      \xdef\regstatsseconds{\intcalcMod{\the\@tempcnta}{60}}%
      \divide \@tempcnta by 60% seconds -> minutes
    \else%
      \@tempcnta=0% minutes = 0
    \fi%
    \ifnum \regstatsseconds < 10%
      \message{Time elapsed for the last compiler run:^^J%
        about \the\@tempcnta:0\regstatsseconds\space%
        (m:ss; \regstatselapsedtime /65536 s).^^J}%
    \else%
      \message{Time elapsed for the last compiler run:^^J%
        about \the\@tempcnta:\regstatsseconds \space%
        (m:ss; \regstatselapsedtime /65536 s).^^J}%
    \fi%
  \fi%
  }
```

If the `timer`-option was not used, we do not use the timer:

```
\ifregstats@timer\else\renewcommand{\regst@ts@timer}{\relax}\fi
```

Initialisation of some commands:

```
\long\def\regstats@firstofone#1{#1}

\providecommand\IfFormatAtLeastTF{\@ifl@t@r\fmtversion}

\let\regst@tsNoeTeX\relax

\xdef\regstats@lft{}
```

LaTeX 2$_\varepsilon$ 2011-06-27 changed the `\enddocument` command and thus broke the atveryend package, which was then fixed. If new LaTeX 2$_\varepsilon$ and old atveryend are combined, `\AtVeryVeryEnd` will never be called. LaTeX 2$_\varepsilon$ 2020-10-01 introduced a new hook management. For LaTeX 2$_\varepsilon$-format 2022-11-01 and newer we use hooks instead of loading the atveryend package.

```
\IfFormatAtLeastTF{2022/11/01}{
   \let\regst@ts@statistics\regstats@firstofone% We do not use \AtVeryVeryEnd.
   \newcommand{\regst@ts@st@tistics}[1]{\AddToHook{begindocument}{%
```

The morewrites package allows for more writes (see p. 15):

```
    \AddToHook{begindocument/end}{\IfPackageLoadedTF{morewrites}{\def\regs@tsmw{65250}}{%
                                                          \ifluatex\def\regs@tsmw{124}\else\def\regs@tsmw{16}\fi}%
```

```
    \AddToHook{enddocument}{\AddToHook{enddocument/afterlastpage}{\AddToHook{enddocument/afteraux}{%
                                                    \AddToHook{enddocument/info}{\AddToHook{enddocument/end}{#1}}}}}}}}
}{\RequirePackage{atveryend}
  \let\regst@ts@statistics\AtVeryVeryEnd
  \IfFormatAtLeastTF{2011/06/27}{
     \@ifpackagelater{atveryend}{2011/06/29}{% 2011/06/30, v1.8, or even more recent: OK
      }{% else: older package version, no \AtVeryVeryEnd
        \let\regst@ts@statistics\regstats@firstofone
       }
   }{% else: older fmtversion: also OK
    }
  \newcommand{\regst@ts@st@tistics}[1]{\AtBeginDocument{\AtEndDocument{\AfterLastShipout{\AtVeryEndDocument{%
                                                                                \AtEndAfterFileList{#1}}}}}}
```

With the seminar class or the slidesec package `\AtVeryVeryEnd` must not be used:

```
  \AtBeginDocument{%
    \@ifclassloaded{seminar}{% no \AtVeryVeryEnd
      \let\regst@ts@statistics\regstats@firstofone}{\relax}
    \@ifpackageloaded{slidesec}{% no \AtVeryVeryEnd
      \let\regst@ts@statistics\regstats@firstofone}{\relax}
```

The morewrites package allows for more writes (see p. 15):

```
    \@ifpackageloaded{morewrites}{\def\regs@tsmw{32767}}{\ifluatex\def\regs@tsmw{124}\else\def\regs@tsmw{15}\fi}%
```

If neither ε-TEX is available nor the etex package loaded, the number of available registers is drastically reduced:

```
    \ifetex\else%
      \@ifpackageloaded{etex}{\relax}{% else
       \gdef\regst@tsNoeTeX{%
        \PackageWarning{regstats}{Neither eTeX nor the e-TeX-package found.\MessageBreak%
          That can mean that e-TeX was disabled or\MessageBreak%
          that your distribution of TeX does not contain e-TeX\MessageBreak%
          or that you simply forgot to say \string\usepackage{etex}\MessageBreak%
          in the preamble of \jobname.tex.\MessageBreak%
          The number of available counter, dimen, skip,\MessageBreak%
          muskip, box, and toks registers as well as the\MessageBreak%
          number of insertions would be larger when using\MessageBreak%
          eTeX or the e-TeX-package;%
         }%
       }%
      }%
    \fi%
    }
 }
```

```
\regst@ts@st@tistics{%
\regst@ts@statistics{%
  \xdef\regstats@message{\relax}%
```

\regstats@regstatA uses three arguments: 1. the used number of registers of some type, 2. the "regular"number of available registers of that type, 3. that number in case of extended register range (ε-TEX). Maximum available minus used registers gives the number of free/currently available registers.

```
  \newcommand{\regstats@regstatA}[3]{%
    \ifx\regst@tsNoeTeX\relax \xdef\regstats@max{#3}\else\xdef\regstats@max{#2}\fi%
    \@tempcnta=\regstats@max \relax%
    \advance\@tempcnta by -#1\relax%
    \xdef\regstats@free{\the\@tempcnta}%
    }%
```

\regstats@regstatB gives the singular (2nd argument) or plural (3rd argument) of the name of that register type (1st argument):

```
  \newcommand{\regstats@regstatB}[3]{%
    \@tempcnta=\regstats@max\relax%
    \advance\@tempcnta by -#1\relax%
    \xdef\regstats@free{\the\@tempcnta}%
    \@tempcnta=#1\relax%
    \ifnum \the\@tempcnta = 0%
      \@tempcnta=2\relax% zero: same as plural
    \fi%
    \ifnum \the\@tempcnta > 1%
      \gdef\regstats@pl{#3}% plural
    \else%
      \gdef\regstats@pl{#2}% singular
    \fi%
```

The number of used registers is given as per cent of the available registers of that type:

```
    \@tempcnta=#1\relax%
    \multiply\@tempcnta by 100\relax%
    \@tempcntb=\regstats@max\relax%
    \divide\@tempcnta by\@tempcntb\relax%
    \xdef\regstats@used{\space(\the\@tempcnta\@percentchar\space used)}%
```

If option `left` was chosen, the number of remaining registers of that type is announced:

```
    \ifregstats@left%
      \ifnum \regstats@free > 0\relax%
        \xdef\regstats@lft{, left: \regstats@free}%
      \else%
        \ifnum \regstats@free = 0\relax%
          \xdef\regstats@lft{, left: \regstats@free !!!}%
        \else% \regstats@free < 0
          \xdef\regstats@lft{, left: \regstats@free ??? **********}%
        \fi%
```

```
      \fi%
    \fi%
}%
```

We now just take the current numbers of the various `count`s:

```
\xdef\regstats@counter{\the\count10}%
\xdef\regstats@dimen{\the\count11}%
\xdef\regstats@skip{\the\count12}%
\xdef\regstats@muskip{\the\count13}%
\xdef\regstats@box{\the\count14}%
\xdef\regstats@toks{\the\count15}%
\xdef\regstats@read{\the\count16}%
\xdef\regstats@write{\the\count17}%
\xdef\regstats@fam{\the\count18}%
\xdef\regstats@language{\the\count19}%
\xdef\regstats@insert{\the\count20}%
```

`\countdef\insc@unt=20` is a synonym for the insertion counter.

`\countdef\allocationnumber=21` is a synonym for the allocation counter `\count21`, which contains the most recently allocated number. For example, if `\newdimen{\regstatsdimen}` allocated a new dimen, and that dimen uses the 48^{th} dimen register, then `\count21` contains the 48.

`\count22` contains -1.

We build the `\regstats@message`:

```
\xdef\regstats@message{\regstats@message\message{^^J}}%
\xdef\regstats@message{\regstats@message\message{Here is how much of TeX's registers you used^^J}}%
\xdef\regstats@message{\regstats@message\message{\space (numbers of available registers are estimated!):^^J}}%
```

While `\xdef\regstats@...{\the\count...}` was used above, if ε-TEX is available we use another register of that type and look at the register number it received.

Classic TEX has $2^8 = 256$ registers, ε-TEX and XETEX have $2^{15} = 32\,768$ registers, and LuaLATEX has even $2^{15} = 65\,536$ registers (for `\count`, `\dimen`, `\skip`, `\muskip`, `\box`, and `\toks`). There are only 16 `\read`s available. `\write`s and `\fam`s were traditionally also 16, see page 15 (write) and page 15 (families) about using more. `\lang`s are only 256 available. `\insert`s are complicated (see p. 16). – Each `\newlength` needs a skip register.

The counter registers:

```
\regstats@regstatA{\regstats@counter}{255}{32767}%
\ifetex\newcounter{regstatscount}\xdef\regstats@counter{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@counter}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@counter\space  counter register\regstats@pl\space%
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The dimen registers:

```
\regstats@regstatA{\regstats@dimen}{255}{32767}%
\ifetex\newdimen{\regstatsdimen}\xdef\regstats@dimen{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@dimen}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@dimen\space    dimen   register\regstats@pl\space%
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The skip registers:

```
\regstats@regstatA{\regstats@skip}{255}{32767}%
\ifetex\newskip\regstatsskip\xdef\regstats@skip{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@skip}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@skip\space     skip    register\regstats@pl\space%
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The muskip registers:

```
\regstats@regstatA{\regstats@muskip}{255}{32767}%
\ifetex\newmuskip\regstatsmuskip\xdef\regstats@muskip{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@muskip}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@muskip\space   muskip  register\regstats@pl\space%
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The box registers:

```
\regstats@regstatA{\regstats@box}{255}{32767}%
\ifetex\newbox\regstatsbox\xdef\regstats@box{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@box}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@box\space      box     register\regstats@pl\space%
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The toks registers:

```
\regstats@regstatA{\regstats@toks}{255}{32767}%
\ifetex\newtoks\regstatstoks\xdef\regstats@toks{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@toks}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@toks\space     toks    register\regstats@pl\space%
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The “read registers”, i. e. input streams:

```
\regstats@regstatA{\regstats@read}{15}{15}%
\ifnum \regstats@free > 0\relax\newread\regstatsread\xdef\regstats@read{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@read}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@read\space     input stream\regstats@pl\space (read) %
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The "write registers", i. e. output streams:
Traditionally, there are 16 available output streams. LuaTEX increases this to 124, and the morewrites package even to 65 250 for LATEX, but not for LuaLATEX. After write 32 749th write on `\write32767`, morewrites additionally uses one count register for each new write. And after the 65 250th write uses `\count32766`, there is no room for another `\count`, and therefore opening further writes fails.

```
\regstats@regstatA{\regstats@write}{15}{\regs@tsmw}%
\ifnum \regstats@free > 0\relax\newwrite\regstatswrite\xdef\regstats@write{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@write}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@write\space    output stream\regstats@pl\space (write) %
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The "fam registers", i. e. math families:
Traditionally, there are 16 available math families. LuaLATEX and XELATEX increase this to 256 (at least since the 2015 release of LATEX 2ε).

> TEX, or more exactly the 8-bit versions of TEX, such as pdfTEX, have a hard limit of 16 on the number of different math font groups (`\fam` or `\mathgroup`) that can be used in a single formula. For each symbol font declared (by a package or in the preamble) an extra math group is allocated, and the same happens for each math alphabet, (such as `\mathbf`) once it gets used anywhere in the document. Up to now, these math alphabet allocations were permanent, even if they were used only once; the result was that in complex documents you could easily run out of available math font groups. The only remedy for this was to define your own math version, which is a complicated and cumbersome process.
>
> This situation has now been improved by the introduction of a new counter `localmathalphabets`: this counter governs how many of the math group slots are assigned locally when a new math alphabet (and a new math group) is needed.
>
> Once the current formula is finished, every such further (local) allocation is undone, giving you a fighting chance of being able to use different new math alphabets in the next formula.
>
> The default value of `localmathalphabets` is 2, but if you need more local alphabets because of the complexity of your document, you can set this to a higher value such as 4 or 5. Setting it even higher is possible, but this would seldom be useful because many group slots will be taken up by symbol fonts and such slots are always permanently allocated, whether used or not.
>
> (Undo math alphabet allocations if necessary, in: LATEX News, Issue 34, 2021-11-15)

So the number of math family groups should have become less relevant.
`\setcounter{localmathalphabets}{` something larger than 2 `}` might help in case of issues. (`\stressFam` in the example file still does not find more than 15 (or 255 with LuaLATEX) `\fam`s available, because it (intentionally) does not use anything local.

```
\regstats@regstatA{\regstats@fam}{15}{\ifluatex 255 \else 15\fi}%
\ifnum \regstats@free > 0\relax\newfam\regstatsfam\xdef\regstats@fam{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@fam}{y}{ies}%
\xdef\regstats@message{\regstats@message\message{ \regstats@fam\space      math famil\regstats@pl\space (fam) %
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The “language registers”, i. e. language codes:

```
\regstats@regstatA{\regstats@language}{255}{255}%
\ifnum \regstats@free > 0\relax\newlanguage\regstatslanguage\xdef\regstats@language{\the\allocationnumber}\fi%
\regstats@regstatB{\regstats@language}{}{s}%
\xdef\regstats@message{\regstats@message\message{ \regstats@language\space language code\regstats@pl\space%
      out of \regstats@max\regstats@used\regstats@lft ^^J}}%
%
```

The “insert registers”, i. e. insertions:
“Inserts are given numbers 254, 253, etc., since they require a `\count`, `\dimen`, `\skip`, and `\box` all with the same number” (source2e.pdf, File 02: ltplain.dtx Date: 2024/02/08 Version v2.3j).
Because counter, dimen, skip, and box registers are also used independently from inserts, it can be expected to have no room for a new insert long before the 255 inserts are used.

When testing, the first `\newinsert` registered into `\insert199`, followed by `\insert198`, ..., `\insert185`, and then apparently some `\count`, `\dimen`, `\skip`, or `\box` register was not available for `\insert184`. Therefore the `\newinsert` registered into `\insert252`, followed by `\insert251`, ..., `\insert201`, and then the already used insert registers were reached and there was `! No room for a new \insert`.

With LuaLaTeX after `\insert183` (!) the next `\newinsert` registered into `\insert252`, followed by `\insert251`, ..., `\insert201`, and then the next `\newinsert` registered into `\insert65534`, followed by `\insert65533`, ..., `\insert318`, and then there was `! No room for a new \insert`. (LaTeX-format before 2023-06-01 erroneously assigned some inserts twice – use a current format!)

Historic versions of LaTeX were limited to less registers, therefore it was possible to `\usepackage{etex} \reserveinserts{17}`, in order to reserve room for up to 17 (or another number given) additional insertion classes, that will not be taken away by `\newcount`, `\newdimen`, `\newskip`, or `\newbox`. For resent LaTeX-versions this is neither necessary nor recommendable: do not use the etex-package. (It would *reduce* the number of available insers!)

When the inserts are needed for floats, the morefloats package can be used to “increased the number of inserts available to the float mechanism” (https://texfaq.org/FAQ-noroom at 2025-01-28). At the last given url “No room for a new »thing«” is treated.

```
\ifx\regst@tsNoeTeX\relax%
  \newinsert\regstatsinsert%
  \xdef\regstats@insert{\the\allocationnumber}%
  \xdef\regstats@max{200}%
  \ifnum \regstats@insert < \regstats@max\relax%
    \xdef\regstats@free{\regstats@insert}%
    \@tempcnta=200\relax%
    \advance\@tempcnta by -\regstats@insert\relax%
    \xdef\regstats@insert{\the\@tempcnta}%
    \regstats@regstatB{\regstats@insert}{}{s}%
    \xdef\regstats@message{\regstats@message\message{ \regstats@insert\space insertion\regstats@pl\space%
          out of \regstats@max\regstats@used\regstats@lft ^^J}}%
  \else%
    \ifnum \regstats@insert = 200\relax%
      \xdef\regstats@message{\regstats@message\message{Number of insertions could not be calculated. ^^J}}%
    \else%
```

```
      \ifnum % \regstats@insert > 200 AND %
        \regstats@insert < 253\relax%
        \@tempcnta=253\relax%
        \advance\@tempcnta by -\regstats@insert\relax%
        \@tempcntb=-200\relax%
        \advance\@tempcntb by \regstats@insert\relax%
        \ifluatex%
          \@tempcntb=-65534\relax%
          \advance\@tempcntb by \regstats@insert\relax%
          \xdef\regstats@message{\regstats@message\message{at least \the\@tempcnta\space insertions out of 253 used, %
                                                                                    about 65 000 left ^^J}}%
        \else%
          \xdef\regstats@message{\regstats@message\message{at least \the\@tempcnta\space insertions out of 253 used, %
                                                                                maybe \the\@tempcntb\space left ^^J}}%
        \fi%
      \else% \regstats@insert > 252, LuaTeX
        \@tempcntb=65534\relax%
        \advance\@tempcntb by -\regstats@insert\relax%
        \advance\@tempcntb by -253\relax%
        \xdef\regstats@message{\regstats@message\message{a lot of insertions out of 65 534 used, %
                                                                                about \the\@tempcntb\space left ^^J}}%
      \fi%
    \fi%
  \fi%
\else%
  \xdef\regstats@max{101}%
  \@tempcnta=\regstats@max\relax%
  \advance\@tempcnta by -\regstats@insert\relax%
  \xdef\regstats@insert{\the\@tempcnta}%
  \@tempcnta=\regstats@max\relax%
  \advance\@tempcnta by -\regstats@insert\relax%
  \xdef\regstats@free{\the\@tempcnta}%
  \regstats@regstatB{\regstats@insert}{}{s}%
  \xdef\regstats@message{\regstats@message\message{ \regstats@insert\space insertion\regstats@pl\space out of %
                                                                    \regstats@max\regstats@used\regstats@lft ^^J}}%
  \xdef\regstats@message{\regstats@message\message{* The number of available inserts might be increased by using %
                                                                                \string\reserveinserts .^^J}}%
\fi%
```

The construction of the message is now finished, the message is delivered:

```
\regstats@message%
```

A note about morewrites:

```
\ifluatex%
\else%
  \def\regs@wmst{16}%
  \ifx\regs@tsmw\regs@wmst\relax%
    \message{The morewrites package was not loaded.^^J}%
    \message{\space With recent LaTeX and morewrites about 32 766 output streams would be available.^^J}%
  \fi%
\fi%
```

If neither ε-TEX nor the e-TEX-package was found, the respective warning is given:

```
\regst@tsNoeTeX%
```

When option `timer` (or `timer=true`) was used, the regstats package additionally gives the time, which was needed for the (last) compilation (run). When more than one compilation run is necessary to compile the document, the individual times have to be added up manually. If `\pdfelapsedtime` was reset by another package, the result is not correct, of course, but unfortunately it is not possible to check for this. You could say `\def\pdfresettimer{\relax}` immediately after `\documentclass[...]{...}` to prevent this. Better use

```
\long\def\pdfresettimer{%
\PackageError{regstats}{\string\pdfresettimer\space used}}
```

to be notified thereof. This redefinition could be implemented in this regstats package, but this would have no effect for the use of `\pdfresettimer` before this package is called. Because this package should be called as late as immediately before `\begin{document}`, this would mean that resetting would be possible during the whole loading of all packages.

`\pdfelapsedtime` is not available when `lua(la)tex` is used instead of `pdf(la)tex` to compile the document. In that case at the very beginning of your `tex` file say

```
\directlua{starttime = os.clock()}
```

(even before `\documentclass`!), and the `timer` option can also be used with LuaLaTeX. When neither `lualatex` nor `pdflatex` is used to compile the document, the timer(-option) does not work.

```
  \regst@ts@timer%
  }%
}

⟨/package⟩
```

6 Installation

6.1 Downloads

Everything is available at https://ctan.org, but may need additional packages themselves.

`regstats.dtx` For unpacking the `regstats.dtx` file and constructing the documentation it is required:

- TEX-Format LATEX 2ε: https://www.CTAN.org/
- document class ltxdoc, 2024/02/08, v2.1j, https://ctan.org/pkg/ltxdoc
- package geometry, 2020/01/02, v5.9, https://ctan.org/pkg/geometry
- package holtxdoc, 2019/12/09, v0.30, https://ctan.org/pkg/holtxdoc
- package fontenc, 2021/04/29, v2.0v, https://ctan.org/pkg/fontenc

`regstats.sty` The `regstats.sty` for LATEX 2ε (i. e. each document using the regstats package) requires:

- TEXFormat LATEX 2ε, https://www.CTAN.org/
- package kvoptions, 2022-06-15, v3.15, http://ctan.org/pkg/kvoptions
- package iftex, http://ctan.org/pkg/iftex, or, if that is not available,
  - + package ifpdf, http://ctan.org/pkg/ifpdf
  - + package ifetex, http://ctan.org/pkg/ifetex
  - + package ifluatex, http://ctan.org/pkg/ifluatex
- only for old LATEX-formats the atveryend package is used, https://ctan.org/pkg/atveryend, otherwise that package is not loaded but the new hook management is used.
- package regstats, 2025-01-28, v1.1b, https://ctan.org/pkg/regstats
  (Because you are reading the documentation for the pagecolor package, it can be assumed that you already have some version of it – is it the current one?)

When option `timer` is used, additionally

- package intcalc, https://ctan.org/pkg/intcalc

is needed.

`regstats-example.tex` The `regstats-example.tex` requires the same files as all documents using the regstats package (see preceding paragraph `regstats.sty`) and additionally:

- class article, 2022/07/02, v1.4n, from classes: https://ctan.org/pkg/classes

Alternative regcount

As possible alternative in section 3 there is listed

- package regcount, 1999/08/03, v1.0, https://ctan.org/pkg/regcount, which gives the wrong number for insertions, because it uses \the\count20, but insertions are *not* allocated from 0 upwards but starting at a higher number moving downward (and having some jumps to other number ranges, see p. 16).

Oberdiek holtxdoc kvoptions

All packages of the 'oberdiek' bundle (especially holtxdoc and kvoptions) are also available in a TDS compliant ZIP archive: https://mirror.ctan.org/install/macros/latex/contrib/oberdiek.tds.zip. It is probably best to download and use this, because the packages in there are quite probably both recent and compatible among themselves.

hyperref

hyperref is not included in that bundle and needs to be downloaded separately, https://mirror.ctan.org/install/macros/latex/contrib/hyperref.tds.zip.

atveryend

atveryend is only loaded for and used with old LaTeX-formats, otherwise that package is not loaded but the new hook management is used. The atveryend package is available from https://mirrors.ctan.org/macros/latex/contrib/atveryend.zip

intcalc

intcalc is available from https://mirrors.ctan.org/install/macros/latex/contrib/intcalc.tds.zip.

iftex ifetex ifluatex ifpdf

iftex is available from https://mirrors.ctan.org/install/macros/generic/iftex.tds.zip, its predecessors ifetex, ifluatex, and ifpdf are no longer officially available for separate download.

Münch

A hyperlinked list of my (other) packages can be found at https://ctan.org/author/muench-hm.

6.2 Package, unpacking TDS

Package. This package is available on https://www.CTAN.org.

https://mirror.ctan.org/macros/latex/contrib/regstats/regstats.dtx The source file.

https://mirror.ctan.org/macros/latex/contrib/regstats/regstats.pdf The documentation.

https://mirror.ctan.org/macros/latex/contrib/regstats/regstats-example.pdf The compiled example file.

https://mirror.ctan.org/macros/latex/contrib/regstats/regstats-example.log A log file for the example.

https://mirror.ctan.org/macros/latex/contrib/regstats/README The README file.

There is also a regstats.tds.zip available:

https://mirror.ctan.org/install/macros/latex/contrib/regstats.tds.zip Everything in TDS compliant, compiled format.

which additionally contains

regstats.ins	The installation file.
regstats.drv	The driver to generate the documentation.
regstats.sty	The .style file.
regstats-example.tex	The example file.
regstats-example.log	A log file for the example.

For required other packages please see the preceding subsection.

Unpacking. The `.dtx` file is a self-extracting docstrip archive. The files are extracted by running the `.dtx` through plain TEX:

```
tex regstats.dtx
```

About generating the documentation see paragraph 6.4 below.

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

```
regstats.sty         → tex/latex/regstats/regstats.sty
regstats.pdf         → doc/latex/regstats/regstats.pdf
regstats-example.tex → doc/latex/regstats/regstats-example.tex
regstats-example.pdf → doc/latex/regstats/regstats-example.pdf
regstats-example.log → doc/latex/regstats/regstats-example.log
regstats.dtx         → source/latex/regstats/regstats.dtx
```

If you have a `docstrip.cfg` that configures and enables docstrip's TDS installing feature, then some files can already be in the right place, see the documentation of docstrip.

6.3 Refresh file name databases

If your TEX distribution (TEX Live, MiKTEX, ...) relies on file name databases, you must refresh these. For example, TEX Live users run `texhash` or `mktexlsr`.

6.4 Some details for the interested

Unpacking with LATEX. The `.dtx` chooses its action depending on the format:

plain TEX: Run docstrip and extract the files.

LATEX: Generate the documentation.

If you insist on using LATEX for docstrip (really, docstrip does not need LATEX), then inform the auto-detect routine about your intention:

```
latex \let\install=y\input{regstats.dtx}
```

Do not forget to quote the argument according to the demands of your shell.

Generating the documentation. You can use both the `.dtx` or the `.drv` to generate the documentation. The process can be configured by a configuration file `ltxdoc.cfg`. For instance, put the following line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfLATEX:

```
pdflatex regstats.dtx
makeindex -s gind.ist regstats.idx
pdflatex regstats.dtx
makeindex -s gind.ist regstats.idx
pdflatex regstats.dtx
```

6.5 Compiling the example

The example file, regstats-example.tex, can be compiled via
`(pdf)(la)tex regstats-example.tex`
or (after removing the `%%` before `\directlua{starttime = os.clock()}` in the line before `\documentclass...`) via
`lua(la)tex regstats-example.tex`.

7 Acknowledgements

I would like to thank Heiko Oberdiek for providing a lot of useful packages (from which I also got everything I know about creating a file in `.dtx` format, OK, say it: copying), Jean-Pierre F. Drucbert (†) for his regcount package, Robin Fairbairns for pointing me to the regcount package.

8 History

[2011/05/14 v1.0a]

- Upload to CTAN.

[2011/05/16 v1.0b]

- Fixed a name clash with `regcount` package.
- `regcount` package listed as possible alternative.
- Bug: `skip` and `muskip` mixed up, fixed.
- Counting of skips, math families, and insertions added.
- Bug fix: insertions are numbered high to low.
- Option `proof` added [obsolete now].

[2011/06/08 v1.0c]

- Bug Fix: Number of available `\skip` registers with ε-TEX.
- Change in ε-TEX-detection.
- New option `left`.

[2011/06/18 v1.0d]

- Bug Fix: Information about used registers/counters fixed.
- New option `timer`.

[2011/08/22 v1.0e]

- The information about the used registers is now presented even later.
- Quite some details in the documentation.
- Hot fix: TEX 2011/06/27 has changed `\enddocument` and thus broken the `\AtVeryVeryEnd` command/hooking of atveryend package as of 2011/04/23, v1.7. Until it is fixed, `\AtEndAfterFileList` *was* used.

[2011/08/23 v1.0f]

- The atveryend package was fixed (2011/06/30, v.1.8). Now regstats differentiates according to TEX format and atveryend package version. 2011/06/30, v.1.8 should become available at CTAN soon. regstats also works with the old version, the information is just presented a little bit earlier during compilation, thus theoretically there could be missed some register use after that information, which would be obvious in the `log`-file. – [atveryend is no longer used after v1.0i of regstats, when a recent LATEX-format with hook-management is used.]

[2012/01/01 v1.0g]

- Now supports (but does not require) LuaLATEX for option `timer`.
- Bug fix: wrong path given in the documentation, fixed.
- Due to the use of temporary counters, no longer a new counter is used (except when option `proof=true` is chosen, of course). [deprecated now]
- Circumvention of the incompatibility of the atveryend package with seminar class and slidesec package introduced.
- Quite some additional changes in the `dtx` and README files.

[2012/01/07 v1.0h]

- Bug fix: `\ifluatex` undefined without ifluatex leads to wrong association of `\else`...`\fi`. Fixed by moving `\ifregstats@timer`.

[2012/04/01 v1.0i]

- Bug fix: removed `.` before `on line`.
- Bug fix: removed a `\pagebreak` after the first line of a page from the documentation.
- Bug fix: added a lot of %-signs at the end of lines in the code.
- This version has been archived at https://web.archive.org/web/20170107053910/https://mirrors.ctan.org/install/macros/latex/contrib/regstats.tds.zip.

[2023-04-04 v1.1a]

- No longer uses the atveryend package for new LaTeX-format but its hook-management.
- No longer uses the ltxcmds package (but it is still loaded by the kvoptions package).
- No longer uses the deprecated `\BeforeClearDocument`.
- Option proof is now deprecated.
- Converted to UTF-8.
- Added `\stress...` commands to the example.
- Updates to documentation and README.

[2025-01-28 v1.1b]

- Documentation update for LaTeX-format 2024-11-01.

When you find a mistake or have a suggestion for an improvement of this package, please send an e-mail to the maintainer, thanks! (Please see BUG REPORTS in the README.)

9 Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

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