Abstract
There are macro and environment arguments that expect numbers that will internally be multiplicated with \unitlength. This package extends the syntax of these arguments that dimens with calculation support can be added for these arguments.

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∗Please report any issues at https://github.com/ho-tex/picture/issues
1 User interface

1.1 Introduction

The environment `picture` and macros such as `\put`, `\line`, `\vector` and other macros have arguments that expect numbers that are used as factor for `\unitlength`. This package redefines such macros and adds code that detects whether such an argument is given as number or as length. In the latter case, the length is used directly without multiplying with `\unitlength`.

1.2 Options

Depending on the available features, also length expressions can be given. Option `calc` loads package `calc`. Then expressions of these package may be used. Otherwise `etex` wraps the length argument inside `\dimexpr...\relax`, if $\varepsilon$-TEX is available. Otherwise option `plain` uses plain assignments without calculation support.

The default is `calc` if package `calc` is loaded before package `picture`. If you specify option `calc` the loading of `calc` is ensured. Otherwise package `picture` looks whether `\dimexpr` is available and uses then option `etex` as default. If $\varepsilon$-TEX also could not be found, then `plain` is used.

1.3 Example

```latex
\documentclass{article}
\usepackage[calc]{picture}
\begin{document}
\setlength{\unitlength}{1pt}
\begin{picture}(\widthof{Hello World}, 10mm)
  \put(0, 0){\makebox(0,0)[lb]{Hello World}}\%
  \put(0, \heightof{Hello World} + \fboxsep){\line(1, 0){\widthof{Hello World}}}\%
  \put(\widthof{Hello World}, 10mm){\line(0, -1){10mm}}\%
\end{picture}
\end{document}
```

1.4 Supported packages

Packages `pspicture` and `pict2e` are supported, but they must be loaded before package `picture`.

New macros can be supported by `\picture@redefine`. The first argument is the macro which contains the arguments in its parameter text that you want to support by package `picture`. The second argument contains the parameter text. Change # to & for the arguments in question. Examples (already used by package `picture`):
2 Implementation

2.1 Identification

```latex
\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{picture}[]
[2019/12/09 v1.5 Dimens for picture macros (HO)]
```

2.2 Options

```latex
\def\Pc@calcname{calc}
\def\Pc@etexname{etex}
\def\Pc@plainname{plain}
```

\texttt{\Pc@method} stores the method to use for calculations. Check which features are available and set the default for \texttt{\Pc@method}.

```latex
\ifpackageloaded{calc}{%
 \let\Pc@method=\Pc@calcname
 \begingroup\expandafter\expandafter\expandafter\endgroup
 \expandafter\ifx\csname dimexpr\endcsname\relax
 \let\Pc@method=\Pc@plainname
 \else
 \let\Pc@method=\Pc@etexname
 \fi
 %}
 \else
 \PackageError{picture}{e-TeX is not available}{@ehc}
 \fi
```

```latex
\DeclareOption{plain}{%
 \let\Pc@method=\Pc@plainname
 %}
 \else
 \PackageError{picture}{e-TeX is not available}{@ehc}
 \fi
```

```latex
\DeclareOption{etex}{%
 \begingroup\expandafter\expandafter\expandafter\endgroup
 \expandafter\ifx\csname dimexpr\endcsname\relax
 \PackageError{picture}{e-TeX is not available}{@ehc}
 \else
 \let\Pc@method=\Pc@etexname
 \fi
 %}
```

```latex
\DeclareOption{calc}{%
 \let\Pc@method=\Pc@calcname
 %}
```

\ProcessOptions*

```latex
\begingroup
 \let\on@line=\@empty
 \PackageInfo{picture}{Calculation method: \Pc@method}%
 \endgroup
```

2.3 Calculation method

```latex
\ifx\Pc@method=\Pc@calcname
 \RequirePackage{calc}%
 \fi
```

2.3.1 Method calc

\ifx\Pc@method\Pc@calcname
\def\Pc@tokslength#1{%
  \begingroup
  \let\calc@error\Pc@calc@error
  \setlength\dimen@{#1\unitlength}\Pc@next\Pc@nil{#1}\
}\%
\let\PcOrg@calc@error\calc@error
\@ifpackagelater{calc}{2007/08/22}{% v4.3
  \def\Pc@calc@error#1{%
    \expandafter\ifx\expandafter\unitlength\noexpand#1\relax
    \let\calc@next##1!{%
      \endgroup
    \aftergroup\afterassignment
    \aftergroup\Pc@next
    }%
    \expandafter\@firstoftwo
  \else
    \expandafter\@secondoftwo
    {%
      \calc@next{#1}%
    }{%
      \PcOrg@calc@error{#1}%
    }%
  }%
  \def\Pc@calc@error#1{%
    \expandafter\ifx\expandafter\unitlength\noexpand#1\relax
    \let\calc@next##1!{%
      \endgroup
    \aftergroup\afterassignment
    \aftergroup\Pc@next
    }%
    \expandafter\@gobble
  \else
    \expandafter\@firstofone
    {%
      \PcOrg@calc@error{#1}%
    }%
  }%
  \fi
\}}%
\def\Pc@calc@error#1{%
  \expandafter\ifx\expandafter\unitlength\noexpand#1\relax
  \let\calc@next##1!{%
    \endgroup
  \aftergroup\afterassignment
  \aftergroup\Pc@next
  }%
  \expandafter\@firstoftwo
  \else
    \expandafter\@secondoftwo
    {%
      \PcOrg@calc@error{#1}%
    }%
  \fi

2.3.2 Method etex

\ifx\Pc@method\Pc@etexname
\def\Pc@tokslength#1{%
  \begingroup
  \afterassignment\Pc@next
  \dimen@=\dimexpr#1\unitlength\Pc@nil{#1}\
}\%
\fi

2.3.3 Method plain

\ifx\Pc@method\Pc@plainname
\def\Pc@tokslength#1{%
\begingroup
\fi
2.3.4 Help macros

\afterassignment\Pc@next
\dimen@=#1\unitlength\Pc@nil{#1}\
\fi

2.4 Redefinitions

\picture@redefine
#1: command name
#2: parameter text, length parameter with & instead of #
\edef\reserved@a{\noexpand\noexpand\csname PcOrg@\expandafter\@gobble\string#1\endcsname}
\toks0{#1}\Pc@first#2&0%
\toks1={#1}\toks2={\Pc@init{#1}}\Pc@scanlength
\edef\reserved@a{\noexpand\noexpand\csname PcOrg@\expandafter\@gobble\string#1\endcsname}
\toks0{#1}\Pc@first#2&0%
\toks1={#1}\toks2={\Pc@init{#1}}\Pc@scanlength

\Pc@nil \Pc@nil must not have the meaning of \relax because of \dimexpr.
\let\Pc@nil\message
\Pc@addtoks
\def\Pc@addtoks#1{
\toks@={\the	oks@#1}
}
\Pc@init
\def\Pc@init#1{
\begingroup
\toks0{#1}
\Pc@first#2&0%
\toks1={#1}\toks2={\Pc@init{#1}}\Pc@scanlength
\edef\reserved@a{\noexpand\noexpand\csname PcOrg@\expandafter\@gobble\string#1\endcsname}
\toks0{#1}\Pc@first#2&0%
\toks1={#1}\toks2={\Pc@init{#1}}\Pc@scanlength

\Pc@finish
\def\Pc@finish#1{
\expandafter\endgroup\expandafter#1\the	oks@}

\picture@redefine
#1: command name
#2: parameter text, length parameter with & instead of #
\edef\reserved@a{\noexpand\noexpand\csname PcOrg@\expandafter\@gobble\string#1\endcsname}
\toks0{#1}\Pc@first#2&0%
\toks1={#1}\toks2={\Pc@init{#1}}\Pc@scanlength
\edef\reserved@a{\noexpand\noexpand\csname PcOrg@\expandafter\@gobble\string#1\endcsname}
\toks0{#1}\Pc@first#2&0%
\toks1={#1}\toks2={\Pc@init{#1}}\Pc@scanlength

\Pc@first
\def\Pc@first#1&{
\toks1={#1}\toks2={\Pc@init{#1}}\Pc@scanlength
\edef\reserved@a{\noexpand\noexpand\csname PcOrg@\expandafter\@gobble\string#1\endcsname}
\toks0{#1}\Pc@first#2&0%
\toks1={#1}\toks2={\Pc@init{#1}}\Pc@scanlength

\Pc@nil \Pc@nil must not have the meaning of \relax because of \dimexpr.
\let\Pc@nil\message
\Pc@addtoks
\def\Pc@addtoks#1{
\toks@={\the	oks@#1}
}
\Pc@init
\Pc@scanlength #1: number of length parameter or zero
158 \def\Pc@scanlength#1{%159 \ifcase#1 %160 \expandafter\Pc@last161 \else162 \toks1=\expandafter{\the\toks1 ###1}163 \toks2=\expandafter{\the\toks2 \Pc@tokslength###1}%164 \expandafter\Pc@scannext165 \fi166 }

\Pc@scannext
167 \def\Pc@scannext#1&{%168 \ifx\#1\%169 \else170 \toks1=\expandafter{\the\toks1 #1}171 \toks2=\expandafter{\the\toks2 \Pc@addtoks#1}%172 \fi173 \Pc@scanlength174 }

\Pc@last
175 \def\Pc@last{%176 \edef\x{%177 \endgroup178 \let\reserved@a\the\toks0 %179 \def\the\toks0 \the\toks1 {%180 \the\toks2 %181 \noexpand\Pc@finish\reserved@a182 }%183 }%184 \x185 }

2.4.1 \LaTeX base macros
186 \picture@redefine\@picture{(&1,&2)(&3,&4)}
187 \picture@redefine\put{(&1,&2)}
188 \picture@redefine\multiput{(&1,&2)}
189 \picture@redefine\@multiput{(&1,&2)}
190 \picture@redefine\line{(#1,#2)&3}
191 \picture@redefine\vector{(#1,#2)}
192 \picture@redefine\dashbox{&1(2,3)}
193 \picture@redefine\@circle{&1}
194 \picture@redefine\@dot{&1}
195 \picture@redefine\@bezier{#1(&2,&3)(&4,&5)(&6,&7)}
196 \picture@redefine\@imakepicbox{(&1,&2)}

2.4.2 Package pspicture

Package \texttt{pspicture} changes the signature of \texttt{@oval} by adding an optional argument.
197 \ifpackageloaded{pspicture}{%198 \picture@redefine\@oval{(#1,#2)(#3,#4)}%199 \picture@redefine\Line{(#1,#2)}%200 \picture@redefine\Curve{(#1,#2)}%201 \picture@redefine\Vector{(#1,#2)}%202 }%
2.5 Check package loading order

\PC@checkpackage

\def\PC@checkpackage#1{%
  \ifpackageloaded{#1}{%
    \AtBeginDocument{%
      \ifpackageloaded{#1}{%
        \PackageWarningNoLine{picture}{%
          Package '#1' is loaded after 'picture'.\MessageBreak
          Load package 'picture' afterwards to get full support%
        }%
      }{}
    }%
  }{}
}
\PC@checkpackage{pict2e}
\PC@checkpackage{pspicture}
\endinput

3 Installation

3.1 Download

Package. This package is available on CTAN\footnote{CTAN:pkg/picture}:


Bundle. All the packages of the bundle ‘picture’ are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

CTAN:install/macros/latex/contrib/picture.tds.zip

TDS refers to the standard “A Directory Structure for \TeX Files” (CTAN:pkg/tds). Directories with texmf in their name are usually organized this way.

3.2 Bundle installation

Unpacking. Unpack the picture.tds.zip in the TDS tree (also known as texmf tree) of your choice. Example (linux):

    unzip picture.tds.zip -d ~/texmf
3.3 Package installation

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

```
tex picture.dtx
```

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

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

3.4 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`.

3.5 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 autodetect routine about your intention:

```
l atex \let\install=y\input{picture.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 the configuration file `ltxdoc.cfg`. For instance, put this 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 picture.dtx
makeindex -s gind.ist picture.idx
pdflatex picture.dtx
makeindex -s gind.ist picture.idx
pdflatex picture.dtx
```

4 History

[2006/08/26 v1.0]

- First released version. (First start of the project was June/July 2002.)
[2007/04/11 v1.1]
- Line ends sanitized.

[2008/11/26 v1.2]
- Package pict2e added to documentation section “Supported packages”.
- Package order of supported packages is checked.

[2009/10/11 v1.3]
- Fix because of new version v4.3 of package calc.

[2016/05/16 v1.4]
- Documentation updates.

[2019/12/09 v1.5]
- Documentation updates.

5 Index

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