The tabstackengine Package

Front-end to the stackengine package, allowing tabbed stacking

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Contents

1 Introduction

The tabstackengine package provides a front end to the stackengine package that allows for the use of tabbing characters within the stacking arguments. **Familiarity with the syntax of the stackengine package is assumed.** When invoked, tabstackengine loads the stackengine package with the `[usestackEOL]` option set, so that the end-of-line (EOL) character in certain stacking arguments will be taken, by default, as \\, rather than a space (which is the default EOL separator in stackengine).

With tabstackengine, command variations are introduced to allow several variants of tabbing within the macro arguments. The default tabbing character is

the ampersand (&); however, the tabbing character can be reset to other values.

In most cases (where it makes sense), a stackengine macro name may be prepended with the word tabbed, align, or tabular to create a new tabstackengine macro that allows for tabbed arguments.

2 Tabbing Variations within tabstackengine

The tabstackengine package syntax allows three types of tabbing variation denoted by the words tabbed, align, and tabular in the macro name itself. In the case of tabbed macros, the tabbed columns all share the same alignment, as dictated by the \stackalignment setting or perhaps provided as an optional argument in some macro forms.

In the case of align macros, the alignment in columns is alternately specified as right, then left, *etc.*, in the manner of the align environment of the amsmath package.

Finally, in the case of tabular macros, an extra argument is passed to the macro that specifies the left-center-right alignment for each individual column, in the manner of {lccr}.

3 Column Spacing within tabstackengine

\fixTABwidth

Intercolumn space can be introduced to tabstackengine output in one of two ways. First, there is a macro setting to force all columns to be the same width (namely, the width of the widest entry in the stack), using the syntax \fixTABwidth{T *or* F}. When set true, column space will be introduced to all but the widest column of a stack, so as to make all columns of a width equal to that of the widest column.

\setstacktabbedgap

Secondly, each of the tabbing variations has the means to introduce a fixed amount of space between columns. By default, the tabbed stacking macros add no space (0pt) between adjacent columns, but this value can be reset with the macro \setstacktabbedgap{*length*}.

\setstackalignngap

In the case of the align stacking macros, there is never any gap introduced after the right-aligned columns. However, the default gap introduced after the left-aligned columns is, by default, 1em (the same gap as \quad). It can be reset with the macro \setstackalignngap{*length*}.

\setstacktabulargap

For the tabular stacks, the default intercolumn gap is the value of \tabcolsep.

The default value may be reset with the macro `\setstacktabulargap{`*length*`}`.

Note that these `\setstack...gap` macros are for setting horizontal gaps between columns of a stack. They should not be confused with the `\setstackgap` macro of stackengine that sets the vertical gap for long and short stacks.

4 Command Summary

Below are the new commands introduced by this package. When there are multiple commands delimited by braces, any one of the commands within the brace may be selected.

```
\tabbed     Shortstack       [alignment]
\align      Shortunderstack
\tabular    Longstack
            Longunderstack
            Centerstack
            Vectorstack      {column alignments}   {tabbed EOL-separated string}

$ \paren    Matrixstack[alignment]{tabbed EOL-separated string}$
  \brace
\bracket
  \vert

\tabbed     stackon                                 {tabbed anchor}{tabbbed argument}
\align      stackunder  [stackgap]  {col. alignments}
\tabular    stackanchor

\setstack   tabbed      gap{length}        Initial Defaults:  0pt
            align                                              1em
            tabular                                            \tabcolsep

\fixTABwidth{T or F}
\setstackTAB{tabbing character}
```

The following macros are macros that can be used for parsing tabbed data outside of a TABstack.

```
\readTABrow{row ID}{tab-separated string}
\TABcell{row ID}{column number}
\TABcells{row ID}
\TABstrut{row ID}
\TABstackMath
\TABstackText
\ensureTABstackMath{}
```

4.1 Command Examples

Below we give examples of the various types of commands made available through the stackengine package.

Tabbed End-of-Line (EOL)-delimited Stacks

Here, the optional argument `[l]` defines the alignment of *all* the columns. The default alignment is `[c]`.

```
\tabbedShortunderstack[l]{A&B&CCC\\aaa&bbb&c\\1111&2&3}
```

A B CCC
aaa bbbc
11112 3

Align End-of-Line (EOL)-delimited Stacks

In an `align`-stack, the column alignments will always be `rlrl...` The gap following the left-aligned columns is set by `\setstackalignngap`.

```
\stackMath$Z:\left\{\alignCenterstack{%
  y&=mx+b,&0&=Ax+By+C\\y_1&=W_1,&y_2&=W_2}\right.$
```

$$Z : \begin{cases} y = mx + b, & 0 = Ax + By + C \\ y_1 = W_1, & y_2 = W_2 \end{cases}$$

Tabular End-of-Line (EOL)-delimited Stacks

In a `tabular`-stack, the alignment of each column is specified in a separate leading argument.

```
\stackText\tabularLongstack{rllc}{%
  9)& $y_1=mx+b$ &linear&*\\10)& $y_2=e^x$ &exponential&[23]}
```

9) $y_1 = mx + b$ linear *
10) $y_2 = e^x$ exponential [23]

Matrix Stack

The `Matrix`-stacks are a tabbed variant of `stackengine`'s `Vector`-stacks.

```
\setstacktabbedgap{1.5ex}
$I = \bracketMatrixstack{1&0&0\\0&1&0\\0&0&1}$
```

$$I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Tabbed Stack

This variant of a `tabbed`-stack stacks exactly two items. Its arguments don't need to be protected. The optional argument is a stacking gap, as in the syntax of the stackengine package.

```
\setstacktabbedgap{1ex}
\tabbedstackon[4pt]{Jack&drove&the car&home.}{SN&V&DO&IO}
```

SN V DO IO
Jack drove the car home.

Align Stack

This is for stacking two items with `rlrl...` alignment pattern.

```
\stackMath\setstackalignгap{3em}
\alignstackunder[10pt]{y&=mx+b,&0&=Ax+By+C}{y_1&=W_1,&y_2&=W_2}
```

$y = mx + b, \qquad 0 = Ax + By + C$

$y_1 = W_1, \qquad y_2 = W_2$

Tabular Stack

This is for stacking two items with specifiable alignment pattern.

```
\stackMath\setstacktabulargap{1ex}\tabularstackanchor[4pt]{rcl}%
  {\bullet\bullet\bullet\bullet&\belowbaseline[-2pt]{\triangle}%
    &\bullet\bullet\bullet\bullet}%
  {1 + 3(4-3) & = & 7 - 6/2}
```

$\begin{array}{rcl} \bullet\bullet\bullet & \triangle & \bullet\bullet\bullet \\ 1 + 2(4 - 3) & = & 6 - 6/2 \end{array}$

Fixed Tab Width (equal width columns, based on largest)

With this mode set, the stack will have fixed-width columns, based on the overall widest entry.

```
\fixTABwidth{T}\setstacktabbedgap{1ex}%
$\left(\tabbedCenterstack[r]{1&34&544\\4324329&0&8\\89&123&1}\right)$
```

$$\left(\begin{array}{rrr} 1 & 34 & 544 \\ 4324329 & 0 & 8 \\ 89 & 123 & 1 \end{array}\right)$$

Setting the Stack Tabbing Character

By default, for the parsing of columns within a row, this package employs the `&` character to delimit the columns. This value can be changed via `\setstackTAB{}`, where the argument is the newly desired tabbing character. It can be any of various characters, including a space token, if one wishes to use a space-separated list to parse the columns. Generally, it may need to be changed if you are building a TABstack inside of an environment that already uses the `&` character as a tab, such as the `tabular` environment for text or the various math environments in the amsmath package.

The Macros `\readTABrow`, `\TABcell(s)`, and `\TABstrut`

One of the nice features of tabstackengine is that it gives you access to its parser, which can be used for tasks unrelated to building stacks. It provides several macros, including `\readTABrow{`*ident*`}{`*tab-separated-string*`}` for digesting a list and assigning it a global ID, in this case, "*ident*". It also provides `\TABcells{`*ident*`}` to tell you how many items are in the list named "*ident*", as well as the macro `\TABcell{`*ident*`}{`*column number*`}` to provide the value of the specified column from the ID'ed row. For example,

```
\setstackTAB{,}
\TABstackMath
\readTABrow{myident}{1,2,   3x , 4, 5,x^2,,g,\textbf{bold 9}}
\TABcells{myident} items in dataset ``myident''\\
The 6th data item is \TABcell{myident}{6}\\
The 9th data item is \TABcell{myident}{9}
```

will yield the following result:

9 items in dataset “myident”
The 6th data item is x^2
The 9th data item is **bold 9**

The result provided by `\TABcell{`*ident*`}{`*column number*`}` has been processed in the following way: 1) leading and trailing spaces have been removed from the column's data, and 2) the column will have been processed in math mode if `\TABstackMath` (see below) had been in force. Thus, placing the cell contents in a box, `\fbox{\TABcell{myident}{3}}` is $\boxed{3x}$.

If one, however, wished to access the raw data, with leading/trailing spaces still intact (and ignoring the `\TABstackMath` setting), one can compose the macro, `\csname TABX`*ident*`X\romannumeral` *column number*`\endcsname`, such that `\fbox{\csname TABXmyidentX\romannumeral 3\endcsname}`, using the above example, would give $\boxed{\text{3x }}$.

Finally, the macro `\TABstrut{myident}` provides a strut that spans the vertical height of the complete row content. Here is `\TABstrut{myident}` (that has been boxed with `\fboxsep=0pt`) compared to the boxed content of the row itself: | $\boxed{123x45x^2g\textbf{bold 9}}$. As you can see, the `\TABstrut{myident}` captures the vertical extent of the complete row data, including the descending g and the superscript of the x^2. The `\TABstrut{}`, when paired with the column content, is useful when one wishes to make all column entries of a row display with equal height and depth, even when their native height varies from column to column.

`\TABstackMath`, `\ensureTABstackMath`, and `\TABstackText`

These macros are *not* needed when building stacks in tabstackengine. When constructing TABstacks, their presence is superfluous because their companion macros, `\stackMath`, `\ensurestackMath`, and `\stackText`, will carry over from the stackengine package.

However, there is one application where their use is required. And that is when you use the facilities of this package *not* to build TABstacks, but *instead* use it to parse data with `\readTABrow{}{}` and present it with `\TABcell{}{}`, respectively. Notably `\TABcell{}{}` does not access the stackengine setting for the status of `\stackMath` and therefore pays attention only to the current setting specified by `\TABstackMath`.

One should note, however, that TABstacks pay attention to both settings. Therefore, **if EITHER `\stackMath` or `\TABstackMath` have been invoked, the TABstack argument will be processed by `\TABcell` in math mode**. This is a good reason to avoid the “TAB” versions of these macros, unless employing them to parse data (and then, reset to `\TABstackText` when you are done with parsing).

5 Known Bugs/Missing Features

1. **Ending on a `\frac`**

   The following code demonstrates a bug when a row ends in `\frac`, when not followed by a space:

```
\documentclass{article}
\usepackage{tabstackengine}
\stackMath
\setstackgap{S}{6pt}
\newcommand\tfrac[2]{\frac{\textrm{#1}}{\textrm{#2}}}
\scriptsize
\begin{document}
\noindent space after tfrac, all is OK:
\par\medskip\noindent\tabbedShortstack[l]{
\rho  &= 2.04 &\tfrac{g}{cm$^3$} \\
M &= 56.10 &\tfrac{g}{mol} \\
c &= 0.05 &\tfrac{mol}{L} \\
}
\par\noindent no space after tfrac results in tfrac set in displaystyle\\
while the rest of the stack is in textstyle:
\par\medskip\noindent\tabbedShortstack[l]{
\rho  &= 2.04 &\tfrac{g}{cm$^3$}\\
M &= 56.10 &\tfrac{g}{mol}\\
c &= 0.05 &\tfrac{mol}{L}\\
}
\end{document}
```

   Here is the result of the above code, showing the difference when a space is included after the `\frac` versus when one is omitted:

   space after tfrac, all is OK:

$$\begin{aligned}\rho &= 2.04\ \frac{\mathrm{g}}{\mathrm{cm}^3}\\ M &= 56.10\,\frac{\mathrm{g}}{\mathrm{mol}}\\ c &= 0.05\ \frac{\mathrm{mol}}{\mathrm{L}}\end{aligned}$$

   no space after tfrac results in tfrac set in displaystyle
   while the rest of the stack is in textstyle:

$$\begin{aligned}&\frac{\mathrm{g}}{\mathrm{cm}^3}\\ \rho &= 2.04\ \frac{\mathrm{g}}{\mathrm{mol}}\\ M &= 56.10\,\frac{\mathrm{mol}}{\mathrm{L}}\\ c &= 0.05\end{aligned}$$

   When the space is omitted, the stack is constructed in `\textstyle`, whereas the closing fractions appear to be constructed in `\displaystyle`. The workaround is to not end the tabstackengine field in a `\frac` without an extra space.

2. **Unary versus Binary Minus Sign**

   The package seems to want to use the minus sign that leads a number in binary mode, that is, as an minus operator rather than as a negative sign.

```
\setstacktabbedgap{1ex}
$\bracketMatrixstack[r]{
-0.84 & 0.21 & -0.11 & 0.110 & 0.13 & 0.34\\
0.21 & -0.43 & 0.14 & 0.06 & 0.30 & -0.22\\
0.27 & 0.13 & -0.54 & 0.25 & -0.27 & 0.16\\
-0.27 &  -0.23 &  0.43 & -0.46 &  0.53 & -0.05\\
0.05 &   0.13 & -0.02 &  -0.10 & -0.03 & -0.02\\
0.23 & -0.32 & 0.21 & -0.11 & 0.41 & -0.34
}$
```

$$\begin{bmatrix} -0.84 & 0.21 & -0.11 & 0.110 & 0.13 & 0.34 \\ 0.21 & -0.43 & 0.14 & 0.06 & 0.30 & -0.22 \\ 0.27 & 0.13 & -0.54 & 0.25 & -0.27 & 0.16 \\ -0.27 & -0.23 & 0.43 & -0.46 & 0.53 & -0.05 \\ 0.05 & 0.13 & -0.02 & -0.10 & -0.03 & -0.02 \\ 0.23 & -0.32 & 0.21 & -0.11 & 0.41 & -0.34 \end{bmatrix}$$

   The workaround is to enclose the minus signs in braces:

```
\setstacktabbedgap{1ex}
$\bracketMatrixstack[r]{
{-}0.84 & 0.21 & {-}0.11 & 0.110 & 0.13 & 0.34\\
0.21 & {-}0.43 & 0.14 & 0.06 & 0.30 & {-}0.22\\
0.27 & 0.13 & {-}0.54 & 0.25 & {-}0.27 & 0.16\\
{-}0.27 &  {-}0.23 &  0.43 & {-}0.46 &  0.53 & {-}0.05\\
0.05 &   0.13 & {-}0.02 &  {-}0.10 & {-}0.03 & {-}0.02\\
0.23 & {-}0.32 & 0.21 & {-}0.11 & 0.41 & {-}0.34
}$
```

$$\begin{bmatrix} -0.84 & 0.21 & -0.11 & 0.110 & 0.13 & 0.34 \\ 0.21 & -0.43 & 0.14 & 0.06 & 0.30 & -0.22 \\ 0.27 & 0.13 & -0.54 & 0.25 & -0.27 & 0.16 \\ -0.27 & -0.23 & 0.43 & -0.46 & 0.53 & -0.05 \\ 0.05 & 0.13 & -0.02 & -0.10 & -0.03 & -0.02 \\ 0.23 & -0.32 & 0.21 & -0.11 & 0.41 & -0.34 \end{bmatrix}$$

3. **No Horizontal Equivalent of \TABstrut**

   As of the initial package release, there is no macro that provides the width of a column's content. I hope to remedy this deficiency in a future release.

4. **Nothing Equivalent to `\hline`**

   This is not a bug, so much as a notation of a missing feature. Currently there is nothing equivalent to `\hline` available for use in tabstackengine arguments.

6 Code Listing

```
\def\tabstackengineversionnumber{V1.00}
%
% tabstackengine initial release
%
% THIS MATERIAL IS SUBJECT TO THE LaTeX Project Public License
%
% V1.00 - Adopted beta version 0.21 as initial release version 1.0
%
\ProvidesPackage{tabstackengine}
[2014/02/11 (\tabstackengineversionnumber) tabbed stacking]
\RequirePackage[usestackEOL]{stackengine}[2013-10-15]
\RequirePackage{calc}

\newtoggle{@doneTABreads}
\newcounter{TAB@stackindex}
\newcounter{TABcellindex@}
\newlength\maxTAB@width

\newcommand\setstackTAB[1]{%
  \ifstrempty{#1}{\def\TAB@char{ }}{\def\TAB@char{#1}}%
  \expandafter\define@processTABrow\expandafter{\TAB@char}%
}

\newcommand\define@processTABrow[1]{%
    \def\@processTABrow##1#1##2||{%
      \def\@preTAB{##1}%
      \def\@postTAB{##2}%
    }%
}
\setstackTAB{&}

\newcommand\readTABrow[2]{%
  \edef\row@ID{#1}%
  \togglefalse{@doneTABreads}%
  \edef\@postTAB{\unexpanded{#2}\expandonce{\TAB@char}}%
  \setcounter{TABcellindex@}{0}%
  \whileboolexpr{ test {\nottoggle{@doneTABreads}}}{%
    \stepcounter{TABcellindex@}%
    \expandafter\@processTABrow\@postTAB||%
    \global\csedef{TABX\row@ID X\roman{TABcellindex@}}{\expandonce\@preTAB}%
    \setbox0=\hbox{%
      \stack@delim\TABcell{\row@ID}{\theTABcellindex@}\stack@delim}%
    \ifdim\wd0>\maxTAB@width\setlength{\maxTAB@width}{\the\wd0}\fi%
    \expandafter\ifstrempty\expandafter{\@postTAB}{%
      \toggletrue{@doneTABreads}%
    }{}%
  }%
  \expandafter\xdef\csname \row@ID TABcells\endcsname{\arabic{TABcellindex@}}%
  \find@TABstrut{#1}%
}

\newcommand\find@TABstrut[1]{%
  \def\@accumulatedTAB{}%
  \setcounter{TABcellindex@}{0}%
```

```
  \expandafter\protected@edef\csname @#1TABtextblob\endcsname{}%
  \whileboolexpr{test {\ifnumless{\theTABcellindex@}{\TABcells{#1}}}}{%
    \stepcounter{TABcellindex@}%
    \protected@edef\@accumulatedTAB{%
      \@accumulatedTAB\TABcell{#1}{\theTABcellindex@}}%
  }%
  \global\csedef{@#1TABtextblob}{\expandonce\@accumulatedTAB}%
}

\newcommand\TAB@delim[1]{#1}%
\newcommand\TABstackMath{%
  \renewcommand\TAB@delim[1]{\ensuremath{##1}}%
}
\newcommand\TABstackText{%
  \renewcommand\TAB@delim[1]{##1}%
}

\newcommand\TABcell[2]{\TAB@delim{%
  \ignorespaces\csname TABX#1X\romannumeral#2\endcsname\unskip}}

\newcommand\TABcells[1]{\csname #1TABcells\endcsname}

% NOTE THAT THE STRUT IS NOT YET TYPESET, SINCE WE DO NOT YET KNOW
% WHETHER \@#1textblob IS TO BE INVOKED IN MATH MODE OR NOT
\newcommand\TABstrut[1]{\vphantom{\csname @#1TABtextblob\endcsname}}

\newcommand\tabbedShortstack[2][\stackalignment]{%
  \@TAB@stack{#1}{#2}{D}{\Shortstack}}

\newcommand\alignShortstack[1]{%
  \@TAB@stack{}{#1}{A}{\Shortstack}}

\newcommand\tabularShortstack[2]{%
  \@TAB@stack{}{#2}{#1}{\Shortstack}}

\newcommand\tabbedShortunderstack[2][\stackalignment]{%
  \@TAB@stack{#1}{#2}{D}{\Shortunderstack}}

\newcommand\alignShortunderstack[1]{%
  \@TAB@stack{}{#1}{A}{\Shortunderstack}}

\newcommand\tabularShortunderstack[2]{%
  \@TAB@stack{}{#2}{#1}{\Shortunderstack}}

\newcommand\tabbedLongstack[2][\stackalignment]{%
  \@TAB@stack{#1}{#2}{D}{\Longstack}}

\newcommand\alignLongstack[1]{%
  \@TAB@stack{}{#1}{A}{\Longstack}}

\newcommand\tabularLongstack[2]{%
  \@TAB@stack{}{#2}{#1}{\Longstack}}

\newcommand\tabbedLongunderstack[2][\stackalignment]{%
  \@TAB@stack{#1}{#2}{D}{\Longunderstack}}

\newcommand\alignLongunderstack[1]{%
```

```
  \@TAB@stack{}{#1}{A}{\Longunderstack}}

\newcommand\tabularLongunderstack[2]{%
  \@TAB@stack{}{#2}{#1}{\Longunderstack}}

\newcommand\tabbedCenterstack[2][\stackalignment]{%
  \@TAB@stack{#1}{#2}{D}{\Centerstack}}

\newcommand\alignCenterstack[1]{%
  \@TAB@stack{}{#1}{A}{\Centerstack}}

\newcommand\tabularCenterstack[2]{%
  \@TAB@stack{}{#2}{#1}{\Centerstack}}

\newcommand\tabbedVectorstack[2][\stackalignment]{%
  \ensureTABstackMath{\@TAB@stack{#1}{#2}{D}{\Vectorstack}}}

\newcommand\alignVectorstack[1]{%
  \ensureTABstackMath{\@TAB@stack{}{#1}{A}{\Vectorstack}}}

\newcommand\tabularVectorstack[2]{%
  \ensureTABstackMath{\@TAB@stack{}{#2}{#1}{\Vectorstack}}}

\newcommand\parenMatrixstack[2][\stackalignment]{%
  \ensureTABstackMath{\left(\@TAB@stack{#1}{#2}{D}{\Vectorstack}\right)}}

\newcommand\braceMatrixstack[2][\stackalignment]{%
  \ensureTABstackMath{\left\{\@TAB@stack{#1}{#2}{D}{\Vectorstack}\right\}}}

\newcommand\bracketMatrixstack[2][\stackalignment]{%
  \ensureTABstackMath{\left[\@TAB@stack{#1}{#2}{D}{\Vectorstack}\right]}}

\newcommand\vertMatrixstack[2][\stackalignment]{%
  \ensureTABstackMath{\left|\@TAB@stack{#1}{#2}{D}{\Vectorstack}\right|}}

\newcommand\@TAB@stack[4]{%
  \setlength{\maxTAB@width}{0pt}%
  \let\sv@stackalignment\stackalignment%
  \edef\stackalignment{#1}%
  \@readMANYrows{#2}%
  \edef\TAB@narg{\narg}%
  \setcounter{TAB@stackindex}{0}%
  \whileboolexpr{test {\ifnumless{\theTAB@stackindex}{\TAB@narg}}}{%
    \stepcounter{TAB@stackindex}%
    \edef\TAB@prefix{\roman{TAB@stackindex}}%
    \protected@edef\TABrow@data{\csname arg\TAB@prefix\endcsname}%
    \def\@tmp{\readTABrow{\TAB@prefix}}%
    \expandafter\@tmp\expandafter{\TABrow@data}%
  }%
%
  \setcounter{TABcellindex@}{0}%
  \whileboolexpr{test {\ifnumless{\theTABcellindex@}{\TABcells{i}}}}{%
    \def\col@stack{%
        \protect\TABstrut{i}%
        \TABcell{i}{\theTABcellindex@}%
        \protect\TABstrut{i}%
}%
```

```
    \stepcounter{TABcellindex@}%
    \@getTABalignment{#3}{\theTABcellindex@}%
    \ifboolexpr{%
      test {\ifnumgreater{\theTABcellindex@}{1}}%
    }{\add@TAB@gap{#3}{\theTABcellindex@}}{}%
    \setcounter{TAB@stackindex}{1}%
    \whileboolexpr{test {\ifnumless{\theTAB@stackindex}{\TAB@narg}}}{%
      \stepcounter{TAB@stackindex}%
      \edef\TAB@prefix{\roman{TAB@stackindex}}%
      \protected@edef\col@stack{\col@stack\SEP@char%
        \protect\TABstrut{\TAB@prefix}%
        \TABcell{\TAB@prefix}{\theTABcellindex@}%
        \protect\TABstrut{\TAB@prefix}%
      }%
    }%
    \iftoggle{fixed@TABwidth}%
      {\makebox[\the\maxTAB@width][\stackalignment]{%
        \expandafter#4\expandafter{\col@stack}}}%
      {\expandafter#4\expandafter{\col@stack}}%
  }%
  \let\stackalignment\sv@stackalignment%
}

\newcommand\tabbedstackon[3][\stackgap]{%
  \@TABstackonunder{#1}{#2}{#3}{D}{\stackon}}

\newcommand\alignstackon[3][\stackgap]{%
  \@TABstackonunder{#1}{#2}{#3}{A}{\stackon}}

\newcommand\tabularstackon[4][\stackgap]{%
  \@TABstackonunder{#1}{#3}{#4}{#2}{\stackon}}

\newcommand\tabbedstackunder[3][\stackgap]{%
  \@TABstackonunder{#1}{#2}{#3}{D}{\stackunder}}

\newcommand\alignstackunder[3][\stackgap]{%
  \@TABstackonunder{#1}{#2}{#3}{A}{\stackunder}}

\newcommand\tabularstackunder[4][\stackgap]{%
  \@TABstackonunder{#1}{#3}{#4}{#2}{\stackunder}}

\newcommand\tabbedstackanchor[3][\stackgap]{%
  \@TABstackonunder{#1}{#2}{#3}{D}{\stackanchor}}

\newcommand\alignstackanchor[3][\stackgap]{%
  \@TABstackonunder{#1}{#2}{#3}{A}{\stackanchor}}

\newcommand\tabularstackanchor[4][\stackgap]{%
  \@TABstackonunder{#1}{#3}{#4}{#2}{\stackanchor}}

\newcommand\@TABstackonunder[5]{%
  \setlength{\maxTAB@width}{0pt}%
  \let\sv@stackalignment\stackalignment%
  \readTABrow{i}{#2}%
  \readTABrow{ii}{#3}%
  \setcounter{TABcellindex@}{0}%
  \whileboolexpr{test {\ifnumless{\theTABcellindex@}{\TABcells{i}}}}{%
```

```
    \stepcounter{TABcellindex@}%
    \@getTABalignment{#4}{\theTABcellindex@}%
    \ifboolexpr{%
      test {\ifnumgreater{\theTABcellindex@}{1}}%
    }{\add@TAB@gap{#4}{\theTABcellindex@}}{}%
    \iftoggle{fixed@TABwidth}%
      {\makebox[\the\maxTAB@width][\stackalignment]{%
       #5[#1]{\TABstrut{i}\TABcell{i}{\theTABcellindex@}\TABstrut{i}}%
                 {\TABstrut{ii}\TABcell{ii}{\theTABcellindex@}\TABstrut{ii}}}}%
      {#5[#1]{\TABstrut{i}\TABcell{i}{\theTABcellindex@}\TABstrut{i}}%
                 {\TABstrut{ii}\TABcell{ii}{\theTABcellindex@}\TABstrut{ii}}}%
  }%
  \let\stackalignment\sv@stackalignment%
}

\newcommand\@getTABalignment[2]{%
  \ifstrequal{#1}{D}{}{%                    T, DO NOTHING (USE \stackalignment)
    \ifstrequal{#1}{A}{%
      \ifnumequal{1}{#2}{%
        \def\stackalignment{r}}{%          A, 1st ELEMENT, SET TO r
        \if l\stackalignment%
          \def\stackalignment{r}\else%     A, SWITCH l TO r
          \def\stackalignment{l}\fi}}{%    A, SWITCH r TO l
          \set@tabularcellalignment{#1}{#2}%   tabular, READ #2 location
      }%
  }%
}

\def\tabbed@gap{0pt}
\def\align@gap{1em}
\def\tabular@gap{\tabcolsep}

\newcommand\setstacktabbedgap[1]{\def\tabbed@gap{#1}}
\newcommand\setstackaligngap[1]{\def\align@gap{#1}}
\newcommand\setstacktabulargap[1]{\def\tabular@gap{#1}}

\newcommand\add@TAB@gap[2]{%
  \ifstrequal{#1}{D}{\hspace{\tabbed@gap}}{%
    \ifstrequal{#1}{A}{%
      \if r\stackalignment\hspace{\align@gap}\fi%
    }{%
      \hspace{\tabular@gap}%
    }%
  }%
}

\newcounter{TABalignmentindex@}

\newcommand\set@tabularcellalignment[2]{%
  \setcounter{TABalignmentindex@}{1}%
  \edef\tabular@settings{#1.}%
  \whileboolexpr{test {\ifnumless{\theTABalignmentindex@}{#2}}}{%
    \stepcounter{TABalignmentindex@}%
    \edef\tabular@settings{\expandafter\@gobble\tabular@settings.}%
  }%
  \expandafter\@getnextTABchar\tabular@settings\\% GET NEXT TAB ALIGNMENT
  \if l\@nextTABchar\edef\stackalignment{l}\else%
```

```
    \if r\@nextTABchar\edef\stackalignment{r}\else%
      \if c\@nextTABchar\edef\stackalignment{c}\fi%
    \fi%                                          IGNORE IF NOT l, c, OR r
  \fi%
}

\def\@getnextTABchar#1#2\\{\gdef\@nextTABchar{#1}}


\newtoggle{fixed@TABwidth}
\newcommand\fixTABwidth[1]{%
  \if T#1\toggletrue{fixed@TABwidth}\else\togglefalse{fixed@TABwidth}\fi%
}
\fixTABwidth{F}

\newcommand\ensureTABstackMath[1]{\TABstackMath#1\TABstackText}

\endinput
```