

tbl.typ: a tbl-like preprocessor for Typst and tablex

Version **TK**

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Contents

1. Introduction	3
2. Region options	4
3. Format specifications	6
3.1. Column classifiers	6
3.2. Column modifiers	7
4. Data	10
5. Differences from traditional <code>tbl</code>	11
6. Known issues	12
7. Examples	13
8. References	19

1. Introduction

Typst [1] is “a new markup-based typesetting system that is powerful and easy to learn.” While Typst provides a built-in `table()` function, it does not currently support more advanced features such as row spans and column spans, fine-grain control of borders, or complex cell alignments. Pg Biel’s `tablex` project [2] provides many of these features. However, it remains the case that writing a table using either `table()` or `tablex()` can require rather verbose syntax.

The `tbl.typ` project is an effort to allow the expression of rich tables in Typst using a more terse syntax. This syntax comes from a UNIX heritage: the `tbl` preprocessor which designed for use with the traditional TROFF typesetting system [3] [4] [5]. Important differences between the syntax of traditional `tbl` and `tbl.typ` are noted [later in this document](#).

After importing the library using `#import "tbl.typ"`, the basic format of a table when using `tbl.typ` is the following:

```
```tbl
Format specifications .
Data
```
```

The two main components of this syntax are:

- *[Format specifications](#)*. This describes the layout of the table in terms of the number and style of columns for each row.

The last line of the format specifications must end in a period (`.`). This is the separator between the two sections.

- *[Data](#)*. This is the content that will fill each cell of the table. Generally every line of input in this section corresponds to a row in the table, though there are exceptions noted later. Cells are separated by the `tab` option which defaults to a TAB character.

2. Region options

In addition to the overall [table syntax](#) itself, you may specify *region options* that control the parsing and styling of the table as a whole using a “show-everything” rule prior to the tables you would like to control. For example:

```
#show: tbl.template.with(
  allbox: true,
  tab: "|",
)
```

The following options are recognized:

| | |
|--|--|
| auto-lines ,
allbox | Like box , but also draw a line between every cell if true . This is the same option from tablex .

<i>Default:</i> false
<i>cf. Example 10, 11, 12, 13.</i> |
| box ,
frame | If true , draw a line around the entire table.

<i>Default:</i> false
<i>cf. Example 1, 2, 3, 4, 5.</i> |
| breakable ,
nokeep | If true , the table can span multiple pages if necessary.

<i>Default:</i> false |
| center ,
centre | Aliases for a tbl-align value of center . |
| decimalpoint | The string used to separate the integral part of a number from the fractional part. Used in N -classified columns.

<i>Default:</i> "." |
| doublebox ,
doubleframe | Like box , but also draw a second line around the entire table if true .

<i>Default:</i> false
<i>cf. Example 14.</i> |
| font | The font for the table. Can be overridden later by the f(...) column modifier.

<i>Default:</i> "Times"
<i>n.b. all tables in this document are formatted with the New Computer Modern font.</i> |

| | |
|-----------------------------|--|
| header-rows | <p>The number of rows at the beginning of the table to consider part of the “header” for the purposes of <code>repeat-header</code>. This option is also controlled by <code>.TH</code> rows in the table data.</p> <p><i>Default:</i> <code>1</code></p> |
| leading | <p>The vertical spacing / leading to apply to table cells. Can be overridden later by the <code>v(...)</code> column modifier.</p> |
| macros | <p>A dictionary of (name, function) pairs that can be used with column modifier <code>m(...)</code>.</p> <p><i>Default:</i> <code>(:)</code></p> |
| pad | <p>This is the padding used for each cell, for use with the Typst <code>pad</code> element function. The <code>left</code> and <code>right</code> keys can be overridden using a numeric column modifier.</p> <p><i>Default:</i> <code>(left: 0.75em, right: 0.75em, top: 3pt, bottom: 3pt)</code></p> |
| repeat-header | <p>If <code>breakable</code> is <code>true</code> and this option is <code>true</code>, then the table header controlled by <code>header-rows</code> will be re-displayed on each subsequent page. This option is also controlled by <code>.TH</code> rows in the table data.</p> <p><i>Default:</i> <code>false</code></p> |
| stroke,
linesize | <p>How to draw all lines in the table.</p> <p><i>Default:</i> <code>1pt</code></p> |
| tab | <p>The string delimiter that separates different cells within a given row of the table data.</p> <p><i>Default:</i> <code>"\t"</code> (a TAB character)
 <i>cf. Example 14. Most tables in this document use <code>" "</code> (a vertical bar) for readability purposes, though this should not be confused with the column classifier of the same name.</i></p> |
| tbl-align | <p>How to align the table as a whole.</p> <p><i>Default:</i> <code>left</code></p> |

3. Format specifications

The format specifications section controls the layout and style of cells within rows and columns of the table.

Each comma or new line of format specification begins a new *row definition*. Within each row definition, encountering a *column classifier character* denotes a new column in the table. The classifier may be followed by any number of *column modifiers*, some of which may have required arguments enclosed in parentheses.

3.1. Column classifiers

The following column classifiers are recognized. They may be given as either capital or lowercase.

| | |
|----------|--------------------|
| L | Left align. |
| R | Right align. |
| C | Center align. |
| N | Numerically align. |

All cells with this classifier in the current column are centered with respect to an *alignment point*, which is determined according to the following rules:

- One position after the leftmost occurrence of the *non-printing token* `\&`, if any is present.
- Otherwise, the rightmost occurrence of the *decimalpoint* string that immediately precedes a digit.
- Otherwise, the rightmost digit.
- Otherwise, the content is instead centered with respect to the column as a whole.

The alignment point is centered horizontally with respect to the column as a whole.

cf. Example 3, 4, 8, 9, 10, 14.

| | |
|----------|--|
| S | This cell is column-spanned by the previous cell to the left in the current row.

<i>The corresponding table data entries should be empty.
cf. Example 4, 5, 10, 12, 14.</i> |
|----------|--|

| | |
|---|---|
| ^ (caret) | This cell is row-spanned by the corresponding cell in the previous row above.

<i>The corresponding table data entries should be empty.
cf. Example 1.</i> |
| _ (underscore),
- (hyphen) | This cell contains a vertically-centered horizontal rule.

<i>The corresponding table data entries should be empty.</i> |
| = (equals sign) | Same as _ , but draw a double horizontal rule instead.

<i>The corresponding table data entries should be empty.</i> |
| (vertical bar) | This classifier does not actually begin a new column, but rather indicates the location of a vertical line.

If placed at the beginning of a row definition, the line is drawn to the left of the first cell in that row. Otherwise, it is drawn to the right of the current cell in that row.

<i>cf. Example 1, 3, 4, 5, 8.</i> |

3.2. Column modifiers

The following column modifiers are recognized. They may be given as either capital or lowercase.

| | |
|---------------|--|
| b | Bold text using the Typst strong element function. |
| d | Down — set the vertical alignment to bottom . |
| e | Equalize the width of all columns with this modifier to the maximum width among those columns.

This overrides modifier x . |
| f(...) | Font name to use is given in parentheses.

f(B) is an alias for the b modifier.
f(I) is an alias for the i modifier.
f(BI) is an alias for providing both of the above modifiers.

<i>cf. Example 12.</i> |
| i | Italicize text using the Typst emph element function. |

m(...) Macro (function) to apply to each corresponding cell. The macros must be scoped using the **macros** region option.

The macro currently only receives a single argument: the content of the cell. A future version may also pass the position of the cell in terms of row number and column number.

o(...) Fill color for the cell is given in parentheses.

cf. Example 11.

p(...) Point size of the font is modified according to the argument in parentheses.

If the argument begins with a **+** or **-**, then the argument is added or subtracted respectively with respect to the current size.

The argument may be suffixed by a unit. If no unit is specified, **pt** is assumed. Valid units are:

- **pt**, **p**: points.
- **mm**: millimeters.
- **cm**, **c**: centimeters.
- **in**, **i**: inches.
- **em**, **m**: **1em** corresponds to the current font size.
- **en**, **n**: one *en* equals half of an em.
- **P**: six *picas* equals one inch.
- **M**: 100 of these equals one em.

cf. Example 8, 12, 14.

t Top — set the vertical alignment to **top**.

cf. Example 12.

u “Stagger” the affected cells so that they appear **between** the current row and the previous one above.

cf. Example 7.

v(...) Vertical spacing (leading) is modified according to the argument in parentheses.

The length argument provided is in the same format as **p(...)**, with a default unit of **pt** and **+** / **-** relative adjustments supported.

w(...) Width of the column is guaranteed to be at least as big as the argument in parentheses, which acts as a *minimum width*.

The length argument provided supports the same units as **p(...)**, with a default unit of **en**. However, relative adjustments are **not** supported.

This overrides modifier **x**.

cf. Example 12, 13.

x Expand the width of the column to **1fr**, which will consume all of the remaining horizontal space on the page or in the current container. Applying this modifier to multiple columns will divide that remaining space evenly between them.

This overrides modifiers **e** and **w(...)**.

z The corresponding cell is treated as if it has **zero** width for the purpose of determining the width of its column.

cf. Example 1.

Number A number given as a column modifier is interpreted as a **en length** which is used as a *column separation*. This is the distance that separates the end of the current cell's content from the beginning of the next cell's content. If there is a vertical line between the two cells, then it will appear centered on this separation distance.

The default column separation is controlled by the sum of the **left** and **right** keys of the **pad** option. When not specified, this defaults to **0.75em + 0.75em**, which traditional TROFF calls **3n**.

cf. Example 13, 14.

4. Data

5. Differences from traditional `tbl`

- [Region options](#) must be specified using a “show-everything” rule; they cannot be provided within the `raw` block itself.
- The `tab` option may be a multi-character string.
- The `linesize` option is expected to be a Typst color, length, or stroke; a dimensionless number does not work.
- The alignment point of [numerically-centered cells](#) that are in the same column as [left-centered](#) or [right-centered](#) cells is always centered with respect to the column as a whole (as if the classifier was `C`), rather than with respect to the widest `L` or `R` entry.
- All [column modifiers](#) that expect an argument must provide that argument in parentheses.
- The `o(...)` column modifier is a `tbl.typ` extension.
- Nothing special needs to be done to use equations within table entries, though [numerically-aligned columns](#) may behave unexpectedly until the `delim` option is implemented.
- An empty entry in the table data must be given even if the cell is spanned or contains a horizontal line.
- `\Rx` table entries are not handled. Use the Typst `repeat` element function instead, though this does not work well at the moment without a fully-functioning `w(...)` column modifier (see [Known issues](#)).

6. Known issues

- The following [region options](#) are not currently supported:
 - `delim` ([GH#1](#))
 - `expand` ([GH#2](#))
 - `nospaces`
 - `nowarn`
- The `pad` region option currently requires the `left` and `right` keys to be explicitly provided. Unexpected behavior may occur if `x` is provided as a key. ([GH#3](#))
- The following [column classifiers](#) are not currently supported:
 - `A` (alphabetic)
 - `||` (double vertical line)
- You may need to apply the `e` column modifier to one or more of the rightmost columns in order to minimize their width. This appears to be a more fundamental issue with Typst or `tablex` at the moment.
- The `w(...)` (minimum width) column modifier currently only sets the width of text blocks; it does not yet affect other table cells. ([GH#5](#))
- `.T&` in the [table data](#) is not currently supported. ([GH#4](#))
- Within text blocks, `.\` comments are not removed, and other TROFF commands are not rejected. ([GH#6](#))
- A table data row consisting of only `=` (double horizontal line) is not currently supported.

7. Examples

The following examples are formatted with these region options:

```
#show: tbl.template.with(box: true, tab: "|")
```

Example 1: adapted from [4]

```
```tbl
lz s | rt
lt| cb| ^
^ | rz s.
left||r
l|center|
|right
```
```

| | | |
|------|--------|-------|
| left | | r |
| l | center | |
| | | right |

Example 2: adapted from [5, p. 41]

```
```tbl
c c c
l l ne .
Fact|Location|Statistic
Largest state|Alaska|591,004 sq. mi.
Smallest state|Rhode Island|1,212 sq. mi.
Longest river|Mississippi-Missouri|3,710 mi.
Highest mountain|Mount McKinley, AK|20,320 ft.
Lowest point|Death Valley, CA|-- 282 ft.
```
```

| Fact | Location | Statistic |
|------------------|----------------------|-----------------|
| Largest state | Alaska | 591,004 sq. mi. |
| Smallest state | Rhode Island | 1,212 sq. mi. |
| Longest river | Mississippi-Missouri | 3,710 mi. |
| Highest mountain | Mount McKinley, AK | 20,320 ft. |
| Lowest point | Death Valley, CA | – 282 ft. |

Example 3: adapted from [4]

```
```tbl
r| l
r n.
software|version
—
AFL|2.39b
Mutt|1.8.0
Ruby|1.8.7.374
TeX Live|2015
```
```

| software | version |
|----------|-----------|
| AFL | 2.39b |
| Mutt | 1.8.0 |
| Ruby | 1.8.7.374 |
| TeX Live | 2015 |

Example 4: adapted from [5, p. 43]

```

```tbl
cf(Courier New) s s s
c | cs s
c | cs s
c |c|c|c
c |c|c|c
l |n |ne |ne.
Composition of Foods

- Food|Percent by Weight
 \^|_
 \^|Protein|Fat|Carbo-
 \^|\^|\^|hydrate
-
Apples|.4|.5|13.0
Halibut|18.4|5.2|...
Lima beans|7.5|.8|22.0
Milk|3.3|4.0|5.0
Mushrooms|3.5|.4|6.0
Rye bread|9.0|.6|52.7
```

```

| Composition of Foods | | | |
|----------------------|-------------------|-----|-------------------|
| Food | Percent by Weight | | |
| | Protein | Fat | Carbo-
hydrate |
| Apples | .4 | .5 | 13.0 |
| Halibut | 18.4 | 5.2 | ... |
| Lima beans | 7.5 | .8 | 22.0 |
| Milk | 3.3 | 4.0 | 5.0 |
| Mushrooms | 3.5 | .4 | 6.0 |
| Rye bread | 9.0 | .6 | 52.7 |

Example 5: adapted from [5, p. 42]

```

```tbl
c s s
c | c | c
l | l | ne .
Major New York Bridges

- Bridge|Designer|Length
-
Brooklyn|J . A . Roebling|1595
Manhattan|G . Lindenthal|1470
Williamsburg|L . L . Buck|1600
-
Queensborough|Palmer &|1182
|Hornbostel
-
||1380
Triborough|O . H . Ammann|_
||383
-
Bronx Whitestone|O . H . Ammann|2300
Throgs Neck|O . H . Ammann|1800
-
George Washington|O . H . Ammann|3500
```

```

| Major New York Bridges | | |
|------------------------|------------------------|--------|
| Bridge | Designer | Length |
| Brooklyn | J . A . Roebling | 1595 |
| Manhattan | G . Lindenthal | 1470 |
| Williamsburg | L . L . Buck | 1600 |
| Queensborough | Palmer &
Hornbostel | 1182 |
| Triborough | O . H . Ammann | 1380 |
| | | 383 |
| Bronx Whitestone | O . H . Ammann | 2300 |
| Throgs Neck | O . H . Ammann | 1800 |
| George Washington | O . H . Ammann | 3500 |

The following examples are formatted with these region options:

```
#show: tbl.template.with(tab: "|")
```

Example 6: adapted from [4]

```
```tbl
rb c lb
r ci l.
r|center|l
ri|ce|le
right|c|left
```
```

| | | |
|----------|--------|----------|
| r | center | l |
| ri | ce | le |
| right | c | left |

Example 7: adapted from [3]

```
```tbl
Cf(BI) Cf(BI) Cf(B), C C Cu.
n|n*#sym.times;*n|difference
1|1
2|4|3
3|9|5
4|16|7
5|25|9
6|36|11
```
```

| <i>n</i> | <i>n</i> × <i>n</i> | difference |
|----------|---------------------|------------|
| 1 | 1 | 3 |
| 2 | 4 | 5 |
| 3 | 9 | 7 |
| 4 | 16 | 9 |
| 5 | 25 | 11 |
| 6 | 36 | |

Example 8: adapted from [5, p. 42]

```
```tbl
c c
np(-2) | n | .
|Stack
|_
1|46
|_
2|23
|_
3|15
|_
4|6.5
|_
5|2.1
|_
_,
```

	Stack
1	46
2	23
3	15
4	6.5
5	2.1

**Example 9:** adapted from [5, p. 37]

<pre> tbl n. 13 4.2 26.4.12 26.4. 12 26.4 .12 abc abc\&amp; 43\&amp;3.22 749.12 </pre>	<pre> 13 4.2 26.4.12 26.4. 12 26.4 .12 abc abc 433.22 749.12 </pre>
----------------------------------------------------------------------------------------	---------------------------------------------------------------------

The following examples are formatted with these region options:

```
#show: tbl.template.with(allbox: true, tab: "|")
```

**Example 10:** adapted from [5, p. 41]

```tbl c s s c c c n n ne . AT&T Common Stock Year Price Dividend 1984 15-20 \ \$1.20 5 19-25 1.20 6 21-28 1.20 7 20-36 1.20 8 24-30 1.20 9 29-37 .30\ ```	<table><tr><th colspan="3">AT&amp;T Common Stock</th></tr><tr><th>Year</th><th>Price</th><th>Dividend</th></tr><tr><td>1984</td><td>15-20</td><td>\$1.20</td></tr><tr><td>5</td><td>19-25</td><td>1.20</td></tr><tr><td>6</td><td>21-28</td><td>1.20</td></tr><tr><td>7</td><td>20-36</td><td>1.20</td></tr><tr><td>8</td><td>24-30</td><td>1.20</td></tr><tr><td>9</td><td>29-37</td><td>.30*</td></tr></table>	AT&T Common Stock			Year	Price	Dividend	1984	15-20	\$1.20	5	19-25	1.20	6	21-28	1.20	7	20-36	1.20	8	24-30	1.20	9	29-37	.30*
AT&T Common Stock																									
Year	Price	Dividend																							
1984	15-20	\$1.20																							
5	19-25	1.20																							
6	21-28	1.20																							
7	20-36	1.20																							
8	24-30	1.20																							
9	29-37	.30*																							

Example 11

<pre> tbl cbo(luma(85%)) co(luma(95%)) c. Grade Points A \$ >= 510\$ B \$ >= 450\$ C \$ >= 390\$ D \$ >= 330\$ </pre>	<table> <tr> <th>Grade</th><th>Points</th></tr> <tr> <td>A</td><td>≥ 510</td></tr> <tr> <td>B</td><td>≥ 450</td></tr> <tr> <td>C</td><td>≥ 390</td></tr> <tr> <td>D</td><td>≥ 330</td></tr> </table>	Grade	Points	A	≥ 510	B	≥ 450	C	≥ 390	D	≥ 330
Grade	Points										
A	≥ 510										
B	≥ 450										
C	≥ 390										
D	≥ 330										

Example 12: adapted from [5, p. 44]

```

```tbl
cf(I) s s
c cw(1in) cw(1in)
ltp(9) ltp(9) ltp(9).
New York Area Rocks
Era|Formation|Age (years)
Precambrian|Reading Prong|>1 billion
Paleozoic|Manhattan Prong|400 million
Mesozoic|T{
#set text(hyphenate: true, overhang: true)
Newark Basin, incl.
Stockton, Lockatong, and Brunswick
formations; also Watchungs
and Palisades.
T}|200 million
Cenozoic|Coastal Plain|T{
#set text(hyphenate: true, overhang: true)
#set par(justify: true)
On Long Island 30,000 years;
Cretaceous sediments redeposited
by recent glaciation.
T}
```

```

| <i>New York Area Rocks</i> | | |
|----------------------------|--|---|
| Era | Formation | Age (years) |
| Precambrian | Reading Prong | >1 billion |
| Paleozoic | Manhattan Prong | 400 million |
| Mesozoic | Newark Basin,
incl. Stockton,
Lockatong, and
Brunswick forma-
tions; also
Watchungs and
Palisades. | 200 million |
| Cenozoic | Coastal Plain | On Long Island
30,000 years; Cre-
taceous sediments
redeposited by re-
cent glaciation. |

Example 13: adapted from [4]

```

```tbl
le le7 lw(10).
The fourth line|_|line 1
of this column|=|line 2
determines|_|line 3
the column width.|T{
This text is too wide to fit into a column of width 17.
T}|line 4
T{
No break here.
T}||line 5
```

```

| | | |
|-------------------|--|--------|
| The fourth line | | line 1 |
| of this column | | line 2 |
| determines | | line 3 |
| the column width. | This text is too wide to fit into a
column of width 17. | line 4 |
| No break here. | | line 5 |

The following examples are formatted with these region options:

```
#show: tbl.template.with(doublebox: true, tab: " : ")
```

Example 14: adapted from [5, p. 45]

```
```tbl
cb s s s s
cp(-2) s s s s
c | c | c | c | c
c | c | c | c | c
r2 | n2 | n2 | n2e | nbe.
Readability of Text
Line Width and Leading for 10-Point Type
-
Line : Set : 1-Point : 2-Point : 4-Point
Width : Solid : Leading : Leading : Leading
-
9 Pica : 93 : --6.0 : --5.3 : --7.1
14 Pica : 450 : --0.6 : --0.3 : --1.7
19 Pica : 5 : --5.1 : 0.0 : --2.0
31 Pica : 3 : --3.8 : --2.4 : --3.6
43 Pica : 5.1 : --90000.000 : --5.9 : --8.8
```
```

| Readability of Text | | | | |
|--|-----------|-----------------|-----------------|-----------------|
| Line Width and Leading for 10-Point Type | | | | |
| Line Width | Set Solid | 1-Point Leading | 2-Point Leading | 4-Point Leading |
| 9 Pica | 93 | -6.0 | -5.3 | -7.1 |
| 14 Pica | 450 | -0.6 | -0.3 | -1.7 |
| 19 Pica | 5 | -5.1 | 0.0 | -2.0 |
| 31 Pica | 3 | -3.8 | -2.4 | -3.6 |
| 43 Pica | 5.1 | -90000.000 | -5.9 | -8.8 |

8. References

- [1] <https://typst.app/>
- [2] Pg Biel, “Typst-tablex.” <https://github.com/PgBiel/typst-tablex>
- [3] <https://man7.org/linux/man-pages/man1/tbl.1.html>
- [4] <https://man.openbsd.org/tbl.7>
- [5] L. L. Cherry, and M. E. Lesk, “Tbl – a program to format tables,” in *Unix Res. System*, A. G. Hume, and M. D. McIlroy, Eds., vol. 2, 10th ed., Murray Hill, New Jersey 07974: Holt Rinehart & Winston, pp. 35–51. [Online]. Available: <https://9p.io/10thEdMan/tbl.pdf>