

MEANDER

User guide

v0.2.4

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MIT

Page layout engine with image wrap-around and text threading.

NEVEN VILLANI

✉ neven@crans.org

MEANDER implements a content layout algorithm that supports automatically wrapping text around figures, and with a bit of extra work it can handle images of arbitrary shape. In practice, this makes **MEANDER** a temporary solution to [issue #5181](#). When Typst eventually includes that feature natively, either **MEANDER** will become obsolete, or the additional options it provides will be reimplemented on top of the builtin features, greatly simplifying the codebase.

Though very different in its modeling, **MEANDER** can be seen as a Typst alternative to L^AT_EX's `wrapfig` and `parshape`, effectively enabling the same kinds of outputs.

Contributions

If you have ideas for improvements, or if you encounter a bug, you are encouraged to contribute to **MEANDER** by submitting a [bug report](#), [feature request](#), or [pull request](#).

Versions

- [dev](#)
- [0.2.4 \(latest\)](#)
- [0.2.3](#)
- [0.2.2](#)
- [0.2.1](#)
- [0.2.0](#)
- [0.1.0](#)

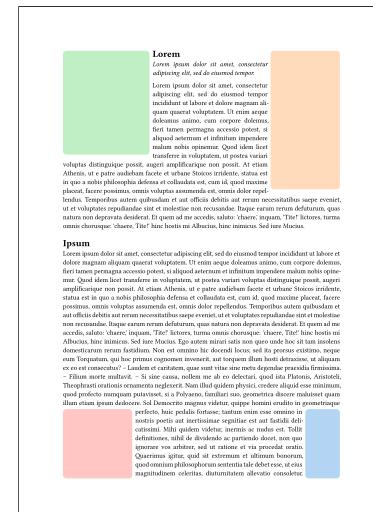


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Chapters that are highlighted⁽¹⁾
have received major updates in
the latest version 0.2.4

Part I

Quick start

Import the latest version of `MEANDER` with:

```
#import "@preview/meander:0.2.4"
```

Do not `#import "@preview/meander:0.2.4": *` globally, it would shadow important functions.

The main function provided by `MEANDER` is `#meander.reflow`, which takes as input a sequence of “containers”, “obstacles”, and “flowing content”, created respectively by the functions `#container`, `#placed`, and `#content`. Obstacles are placed on the page with a fixed layout. After excluding the zones occupied by obstacles, the containers are segmented into boxes then filled by the flowing content.

More details about `MEANDER`’s model are given in [Section II](#).

I.1 A simple example

Below is a single page whose layout is fully determined by `MEANDER`. The general pattern of `#placed` + `#container` + `#content` is almost universal.

```
#meander.reflow({
  import meander: *
  // Obstacle in the top left
  placed(top + left, my-img-1)

  // Full-page container
  container()

  // Flowing content
  content[
    _lorem(60)
    #[

      #set par(justify: true)
      #lorem(300)
    ]
    #lorem(200)
  ]
})
```

1

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Within a `#meander.reflow` block, use `#placed` (same parameters as the standard function `#place`) to position obstacles made of arbitrary content on the page, specify areas where text is allowed with `#container`, then give the actual content to be written there using `#content`.

MEANDER is expected to automatically respect the majority of styling options, including headings, paragraph justification, bold and italics, etc. Notable exceptions that must be specified manually are detailed in [Section IV](#).

If you find a style discrepancy, make sure to file it as a [bug report](#), if it is not already part of the [known limitations](#).

I.2 Multiple obstacles

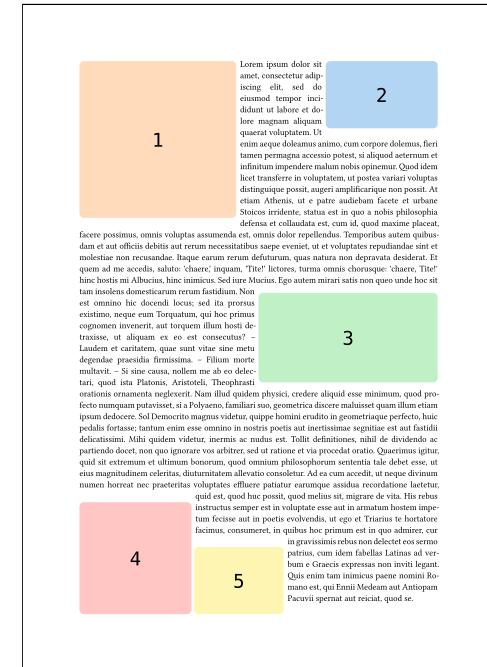
A single `#meander.reflow` invocation can contain multiple `#placed` objects. A possible limitation would be performance if the number of obstacles grows too large, but experiments have shown that up to ~100 obstacles is still workable.

In fact, this ability to handle arbitrarily many obstacles is what I consider **MEANDER**'s main innovation compared to [WRAP-IT](#), which also provides text wrapping but around at most two obstacles.

```
#meander.reflow({
  import meander: *

  // As many obstacles as you want
  placed(top + left, my-img-1)
  placed(top + right, my-img-2)
  placed(horizon + right, my-img-3)
  placed(bottom + left, my-img-4)
  placed(bottom + left, dx: 32%,
         my-img-5)

  // The container wraps around all
  container()
  content[
    #set par(justify: true)
    #lorem(430)
  ]
})
```



Technically, **MEANDER** can only handle rectangular obstacles. However, thanks to this ability to wrap around an arbitrary number of obstacles, we can approximate a non-rectangular

obstacle using several rectangles. See concrete applications and techniques for defining these rectangular tilings in [Section III](#).

I.3 Columns

Similarly, `MEANDER` can also handle multiple occurrences of `#container`. They will be filled in the order provided, leaving a (configurable) margin between one and the next. Among other things, this can allow producing a layout in columns, including columns of uneven width (a longstanding [typst issue](#)).

```
#meander.reflow({
    import meander: *
    placed(bottom + right, my-img-1)
    placed(center + horizon, my-img-2)
    placed(top + right, my-img-3)

    // With two containers we can
    // emulate two columns.

    // The first container takes 60%
    // of the page width.
    container(width: 60%, margin: 5mm)
    // The second container automatically
    // fills the remaining space.
    container()

    content[#lorem(470)]
})
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Quisque voluptatem, ut enim sequitur dolorem animo, cum corpore dolens, fieri tamen permagna accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinatur. Quod idem licet rursum, quod est in aliis, non potest, ut varius voluptas distinguere possit, angari amplius carique non posset. At etiam Athene, ut patre audiebam faecile ut urbane Stoicos irridente, statua est in quo a nobis philosophia defensa et collaudata est, cum id, quod maxime placat, facere possimus, omnis voluptas assumenda est, omnis dolor repellendus. Et qui natus sum, quibusdam et aut officiis debet esse, ut non necessaria, sed etiam utilitas et voluptatis repudiandas sint et molestias non revocandas. Itaque carum verum defunctorum, quas natura non deprivata desiderat. Et quem ad me accedit, salutem: 'charere' inquit, 'Tit'e' lectores, turma omnis chorosque: 'charere, Tit'e' hinc hostis mihi abscurus, hinc inimicus. Sed iure Mucius Ego autem mirari satis non quoce unde hoc sit tam insolens dominus. Non est omnino hic decordi locus: sed ita primum existimat, neque eum Torquatum, qui hoc primus cognovit inveniret, aut torquem illum hosti detrahuisse, ut aliquis deinde contumeliam posset.

— Laudem et certe quae sunt virtus sine metu degredi praevisa firmissima. — Filium morte multavisti — Si sine causa, nullum me ab eo delectari, quod ista Platonis, Aristoteeli, Theophrasti orationis ornamenta neglexerit. Nam illud quidem physici, credere aliquid esse minimum, quod profectus deinceps putavisset, si a Polyceno, familiari suo, genito in diebus, quae sunt virtus sine metu degredi posset. Sal Democrito magnis vobis, quippe horum eruditis in geometria perfectoro, hunc pedalis fortasse, tantum enim esse omnino in nostris poësi aut inertrissime segnitiae est aut fastidi delicatissimi. Mihi quidem videtur, inermis ac nudus est. Tota definitionis, nihil de divisione ac partiendo docet, non quo ignorat, sed quod non potest, et non potest et via procedat ostendit. Quarundam igitur, quid est extrema, et ultimum bonorum, quod omnium philosophorum sententia tale debet esse, ut eius magnitudinem celestis diuturnitatem allevato consideret. Ad ea cum accedit, ut neque diu nimen horreat nec præteritas voluptates effluere patiatur eumque assidua recordatione latetur, quid est, quod huc possit, quod

medus sit, ingratis de vita. His rebus instrumentis semper est in voluptate esse aut in armatum hostem impetrare, leviter aut in poësi evolviendis, ut ego et Triarius te horatore facimus, consumeret, et quod primum est in quo salutem ex gratia datur, non delecto et non se patris, cum idem fabulus Latinus ad verbum e Graecis expressas non inviti legant. Quis enim tam innicuus paene nomini Romanico est, qui Enni Medeum aut Andromacham Paucum special aut recitat, quod inter nos, et quod fabilio delectari doct. Latinas litteras oferit? Synephebos ego, inquit, potius Caecili aut Andriam Terentii quam utramque Menandri legam? A quod tantum dissentio, ut, cum Sophocles vel optimo scriptori Eleutherio, in se male conversam Alii mali legendam patem, de quo

1

2

3

I.4 Going further

If you want to learn more advanced features or if there's a glitch in your layout, here are my suggestions.

In any case, I recommend briefly reading [Section II](#), as having a basic understanding of what happens behind the scenes can't hurt.

To learn how to handle non-rectangular obstacles, see [Section III](#).

If you have issues with text size or paragraph leading, or if you want to enable hyphenation only for a single paragraph, you can find details in [Section IV](#).

To produce layouts that span more or less than a single page, see [Section V](#). If you are specifically looking to give `MEANDER` only a single paragraph and you want the rest of

the text to gracefully fit around, consult [Section V.4](#). If you want to learn about what to do when text overflows the provided containers, this is covered in [Section V.5](#).

For more obscure applications, you can read [Section VI](#), or dive directly into the module documentation in [Section VIII](#).

Part II

Understanding the algorithm

Although it can produce the same results as parshape in practice, `MEANDER`'s model is fundamentally different. In order to better understand the limitations of what is feasible, know how to tweak an imperfect layout, and anticipate issues that may occur, it helps to have a basic understanding of `MEANDER`'s algorithm(s).

Even if you don't plan to contribute to the implementation of `MEANDER`, I suggest you nevertheless briefly read this section to have an intuition of what happens behind the scenes.

II.1 Page tiling

When you write some layout such as the one below, `MEANDER` receives a sequence of elements that it splits into obstacles, containers, and content.

```
#meander.reflow({
    import meander: *
    placed(bottom + right, my-img-1)
    placed(center + horizon, my-img-2)
    placed(top + right, my-img-3)

    container(width: 60%)
    container(align: right, width: 35%)
    content[#lorem(470)]
})
```

First the `#measure` of each obstacle is computed, their positioning is inferred from the alignment parameter of `#placed`, and they are placed on the page. The regions they cover are marked as forbidden.

Then the same job is done for the containers, marking those regions as allowed. The two sets of computed regions are combined by subtracting the forbidden regions from the allowed ones, giving a rectangular subdivision of the usable areas.

You can have a visual representation of these regions by replacing `#meander.reflow` with `#meander.regions`, with the same inputs.

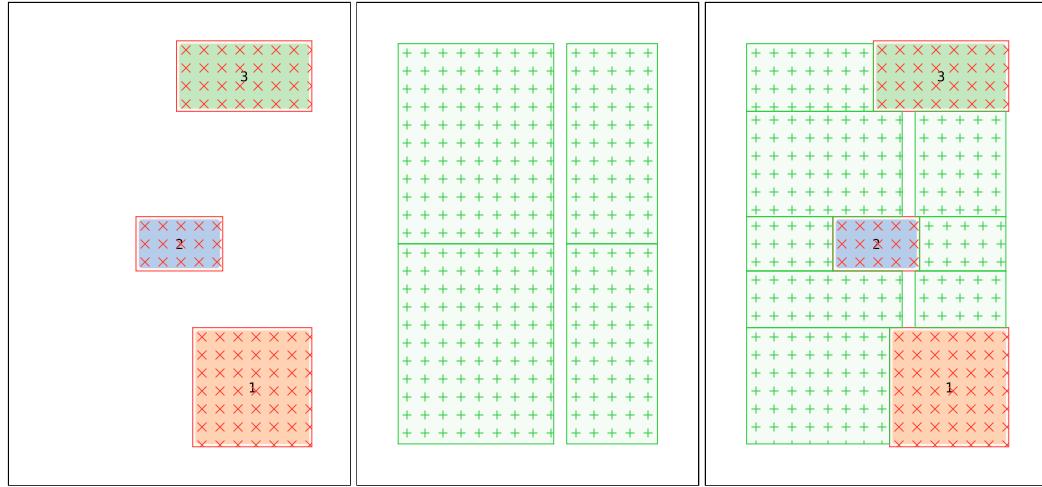


Figure 1: Left to right: the forbidden, allowed, and combined regions

II.2 Content bisection

The second building block of `MEANDER` is its algorithm to split content. The regions computed by the tiling algorithm must be filled in order, and text from one box might overflow to another. The content bisection rules are all `MEANDER`'s heuristics to split text and take as much as fits in a box.

For example, consider the content `bold(lorem(20))` which does not fit in the container `box(width: 5cm, height: 5cm)`:

**Lorem ipsum dolor sit
 amet, consectetur adipi-
 iscing elit, sed do eius-
 mod tempor incididunt
 ut labore et dolore mag-
 nam aliquam quaerat.**

`MEANDER` will determine that

1. the content fits in the box until “eius-”, and everything afterwards is overflow,
2. splitting `#strong` text is equivalent to applying `#strong` to both halves,
3. therefore the content can be separated into
 - on the one hand, the text that fits `strong("Lorem ... eius-")`
 - on the other hand, the overflow `strong("mod ... quaerat.")`

If you find weird style artifacts near container boundaries, it is probably a case of faulty bisection heuristics, and deserves to be [reported](#).

II.3 Threading

The threading process interactively invokes both the tiling and the bisection algorithms, establishing the following dialogue:

1. the tiling algorithm yields an available container
2. the bisection algorithm finds the maximum text that fits inside
3. the now full container becomes an obstacle and the tiling is updated
4. start over from step 1.

The order in which the boxes are filled always follows the priority of

- container order,
- top → bottom,
- left → right.

In other words, `MEANDER` will not guess columns, you must always specify columns explicitly.

The exact boundaries of containers may be altered in the process for better spacing.

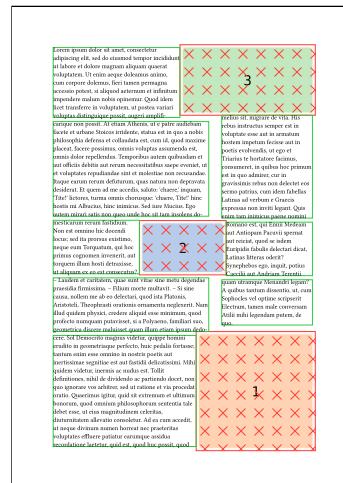


Figure 2: Debug view of the final output of `#meander.reflow.with(debug: true)`

Every piece of content produced by `#meander.reflow` is placed, and therefore does not affect layout outside of `#meander.reflow`. See [Section V.4](#) for solutions.

Part III

Contouring

I made earlier two seemingly contradictory claims:

1. `MEANDER` supports wrapping around images of arbitrary shape,
2. `MEANDER` only supports rectangular obstacles.

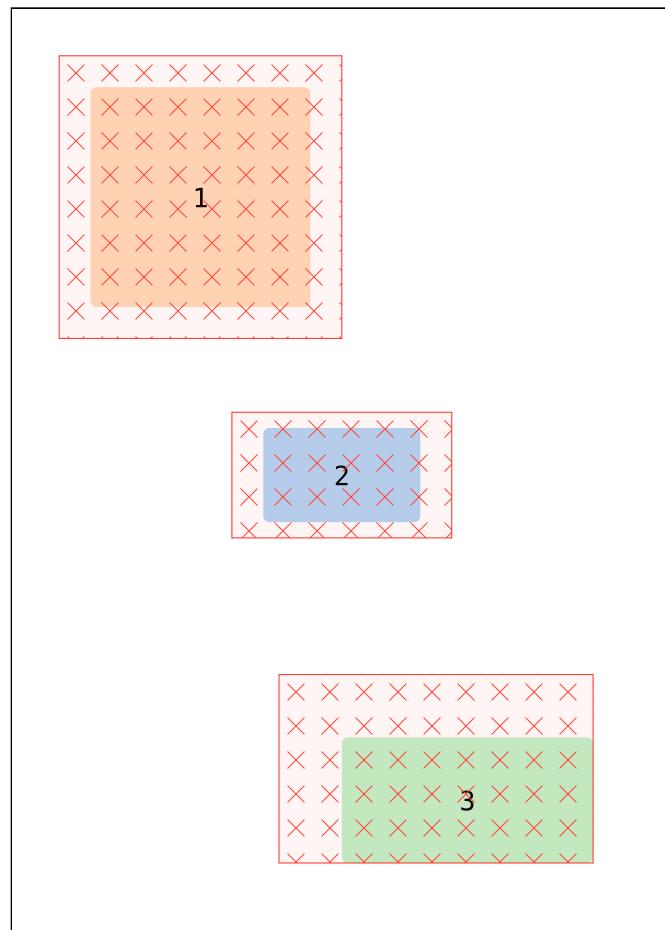
This is not a mistake. The reality is that these statements are only incompatible if we assume that 1 image = 1 obstacle. We call “contouring functions” the utilities that allow splitting one image into multiple obstacles to approximate an arbitrary shape.

All contouring utilities live in the `contour` module.

III.1 Margins

The simplest form of contouring is adjusting the margins. The default is a uniform `5pt` gap, but you can adjust it for each obstacle and each direction.

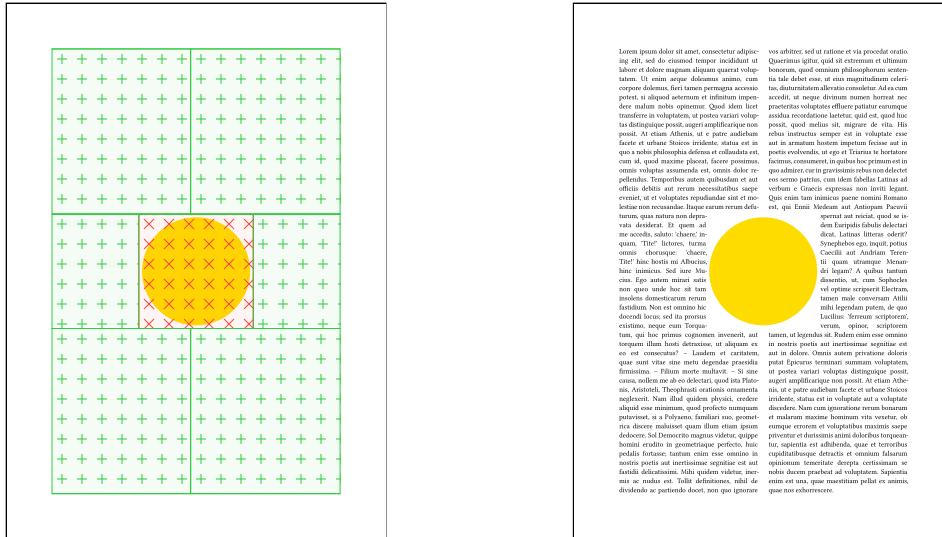
```
#meander.regions({
    import meander: *
    placed(
        top + left,
        boundary:
            contour.margin(1cm),
        my-img-1,
    )
    placed(
        center + horizon,
        boundary:
            contour.margin(
                5mm,
                x: 1cm,
            ),
        my-img-2,
    )
    placed(
        bottom + right,
        boundary:
            contour.margin(
                top: 2cm,
                left: 2cm,
            ),
        my-img-3,
    )
})
```



III.2 Boundaries as equations

For more complex shapes, one method offered is to describe as equations the desired shape. Consider the following starting point: a simple double-column page with a cutout in the middle for an image.

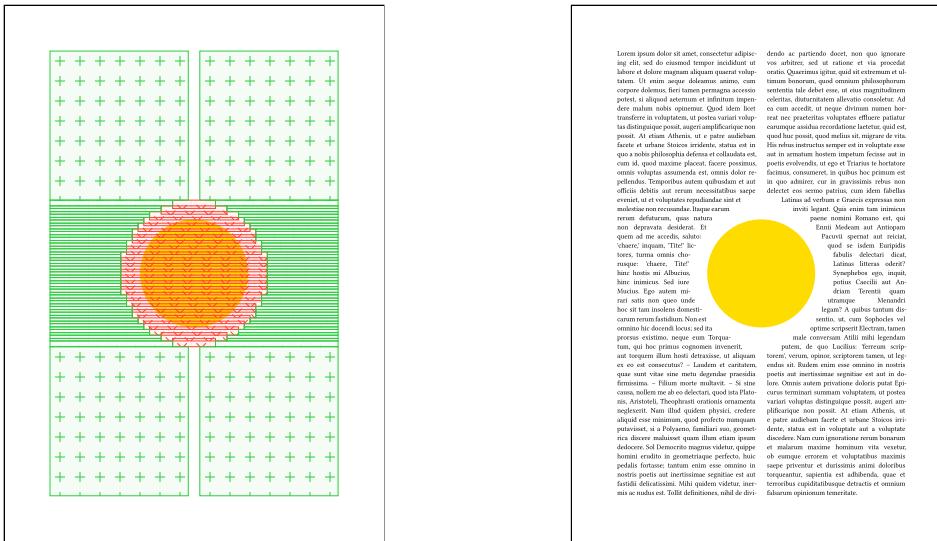
```
#meander.reflow({
  import meander: *
  placed(center + horizon) [
    #circle(radius: 3cm, fill: yellow)
  ]
  container(width: 50% - 3mm, margin: 6mm)
  container()
  content[
    #set par(justify: true)
    #lorem(590)
  ]
})
```



`MEANDER` sees all obstacles as rectangular, so the circle leaves a big ugly `square hole` in the page. Fortunately the desired circular shape is easy to describe in equations, and we can do so using the function `#contour.grid`, which takes as input a 2D formula normalized to $[0, 1]$, i.e. a function from $[0, 1] \times [0, 1]$ to `bool`.

```
#meander.reflow({
  import meander: *
  placed(
    center + horizon,
    boundary:
      // Override the default margin
      contour.margin(1cm) +
      // Then redraw the shape as a grid
      contour.grid(
        // 25 vertical and horizontal subdivisions.
        // Just pick a number that looks good.
        // A good rule of thumb is to start with obstacles
        // about as high as one line of text.
        div: 25,
        // Equation for a circle of center (0.5, 0.5) and radius 0.5
        (x, y) => calc.pow(2 * x - 1, 2) + calc.pow(2 * y - 1, 2) <= 1
      ),
      // Underlying object
      circle(radius: 3cm, fill: yellow),
    )
    // ...
  )
})
```

This results in the new subdivisions of containers below.



This enables in theory drawing arbitrary paragraph shapes. In practice not all shapes are convenient to express in this way, so the next sections propose other methods.

Watch out for the density of obstacles. Too many obstacles too close together can impact performance.

III.3 Boundaries as layers

If your shape is not convenient to express through a grid function, but has some horizontal or vertical regularity, here are some other suggestions. As before, they are all normalized between 0 and 1.

III.3.1 Horizontal rectangles

`#contour.horiz` and `#contour.width` produce horizontal layers of varying width. `#contour.horiz` works on a (left, right) basis (the parameterizing function should return the two extremities of the obstacle), while `#contour.width` works on an (anchor, width) basis.



```
#meander.reflow({
  import meander: *
  placed(right + bottom,
  boundary:
    // The right aligned edge makes
    // this easy to specify using
    // `horiz`
    contour.horiz(
      div: 20,
      // (left, right)
      y => (1 - y, 1),
    ) +
    // Add a post-segmentation margin
    contour.margin(5mm)
  )[...]
  // ...
})
```

The interpretation of `(flush)` for `#contour.width` is as follows:

- if `(flush): left`, the anchor point will be the left of the obstacle;
 - if `(flush): center`, the anchor point will be the middle of the obstacle;
 - if `(flush): right`, the anchor point will be the right of the obstacle.

```
#meander.reflow({
    import meander: *
    placed(center + bottom,
    boundary:
        // This time the vertical symmetry
        // makes `width` a good match.
        contour.width(
            div: 20,
            flush: center,
            // Centered in 0.5, of width y
            y => (0.5, y),
        ) +
        contour.margin(5mm)
    ) [...]
    // ...
})
```

Latinum litteras et Syntephes ego, impetr. petri Canticus aut Andram Terentii quam uniusque M. Tullii Ciceronis? A quibus enim scriptoribus? Et quae sunt litterae? Et quae sunt scriptores? Nam cum litteris illis legendarum putem, de quo Lucilius "terram scriptorum" verum, opinio scriptorum tamis et legendarum sit Rudem enim esse omnino in nostri poeta ut inerritissime segnitiae est aut in dober. Omnis aut privata doloria pula Epicurus terrena summae volupsum, ut posse est, non potest. Non potest enim posse, ut etiam in dober. Et quae sunt litterae? Et a patre audendum facere et utrue Stoicos irridente, status est in voluptate aut in voluptate discedere. Nam cum ignorantes rerum bonarum et malorum maxime hominum vita vixit, ob europeum et grecum, et ruris serpe dulcior et durissimam anima dolorum frequentia, sapientia est astillenda, quae et tenet et peripatetica detinens et omnium fabrum opiniones tenet. Drecta certissima se nobis dicunt preceptum ad voluptatem. Sapiens enim et un, quae maximum pellat ex animi, quae nos exhortare.



III.3.2 Vertical rectangles

`#contour.vert` and `#contour.height` produce vertical layers of varying height.

Latinum litteras et Syntephes ego, impetr. petri Canticus aut Andram Terentii quam uniusque M. Tullii Ciceronis? A quibus enim scriptoribus? Et quae sunt litterae? Et quae sunt scriptores? Nam cum litteris illis legendarum putem, de quo Lucilius "terram scriptorum" verum, opinio scriptorum tamis et legendarum sit Rudem enim esse omnino in nostri poeta ut inerritissime segnitiae est aut in dober. Omnis aut privata doloria pula Epicurus terrena summae volupsum, ut posse est, non potest. Non potest enim posse, ut etiam in dober. Et quae sunt litterae? Et a patre audendum facere et utrue Stoicos irridente, status est in voluptate aut in voluptate discedere. Nam cum ignorantes rerum bonarum et malorum maxime hominum vita vixit, ob europeum et grecum, et ruris serpe dulcior et durissimam anima dolorum frequentia, sapientia est astillenda, quae et tenet et peripatetica detinens et omnium fabrum opiniones tenet. Drecta certissima se nobis dicunt preceptum ad voluptatem. Sapiens enim et un, quae maximum pellat ex animi, quae nos exhortare.

```
#meander.reflow({
    import meander: *
    placed(top,
    boundary:
        contour.vert(
            div: 25,
            x => if x <= 0.5 {
                (0, 2 * (0.5 - x))
            } else {
                (0, 2 * (x - 0.5))
            },
        ) +
        contour.margin(5mm)
    ) [...]
    // ...
})
```

The interpretation of `(flush)` for `#contour.height` is as follows:

- if `(flush): top`, the anchor point will be the top of the obstacle;

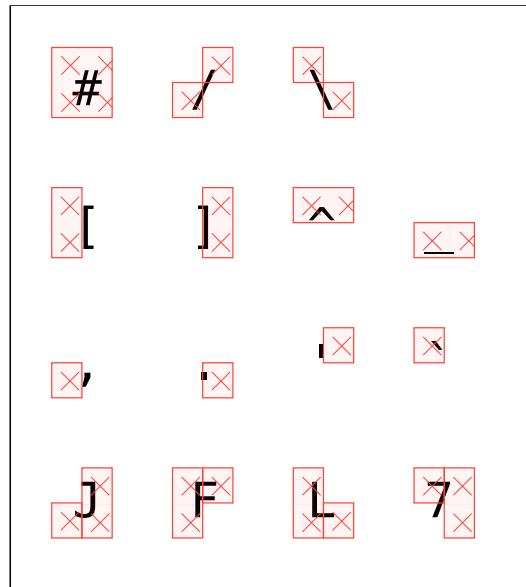
- if `(flush): horizon`, the anchor point will be the middle of the obstacle;
 - if `(flush): bottom`, the anchor point will be the bottom of the obstacle.

```
#meander.reflow({  
  import meander: *  
  placed(left + horizon,  
    boundary:  
      contour.height(  
        div: 20,  
        flush: horizon,  
        x => (0.5, 1 - x),  
      ) +  
      contour.margin(5mm)  
    )[...]  
  // ...  
})
```

III.4 Autocontouring

The contouring function `#contour.ascii-art` takes as input a string or raw code and uses it to draw the shape of the image. The characters that can occur are:

```
#meander.reflow(debug: true, {
    import meander: *
    placed(top + left,
        boundary: contour.margin(6mm) +
            contour.ascii-art(
                `````
 # / \
 [] ^ _`````)
 J F L 7
        `````
    )
})[#image]
})
```



If you have [ImageMagick](#) and [Python 3](#) installed, you may use the auxiliary tool `autocontour` to produce a first draft. This small Python script will read an image, pixelate it, apply a customizable threshold function, and produce a `*.contour` file that can be given as input to `#contour.ascii-art`.

```
# Install the script
$ pip install autocontour

# Run on `image.png` down to 15 by 10 pixels, with an 80% threshold.
$ autocontour image.png 15x10 80%

# Then use your text editor of choice to tweak `image.png.contour`
# if it is not perfect.
```

```
#meander.reflow({
    import meander: *
    placed(top + left,
        // Import statically generated boundary.
        boundary: contour.ascii-art(read("image.png.contour")),
        image("image.png"),
    )
    // ...
})
```

You can read more about `autocontour` on the dedicated [README.md](#)

`autocontour` is still very experimental.

The output of `autocontour` is unlikely to be perfect, and it is not meant to be. The format is simple on purpose so that it can be tweaked by hand afterwards.

III.5 More to come

If you find that the shape of your image is not convenient to express through any of those means, you're free to submit suggestions as a [feature request](#).

Part IV

Styling

MEANDER respects most styling options through a dedicated content segmentation algorithm, as briefly explained in [Section II](#). Bold, italic, underlined, stroked, highlighted, colored, etc. text is preserved through threading, and easily so because those styling options do not affect layout much.

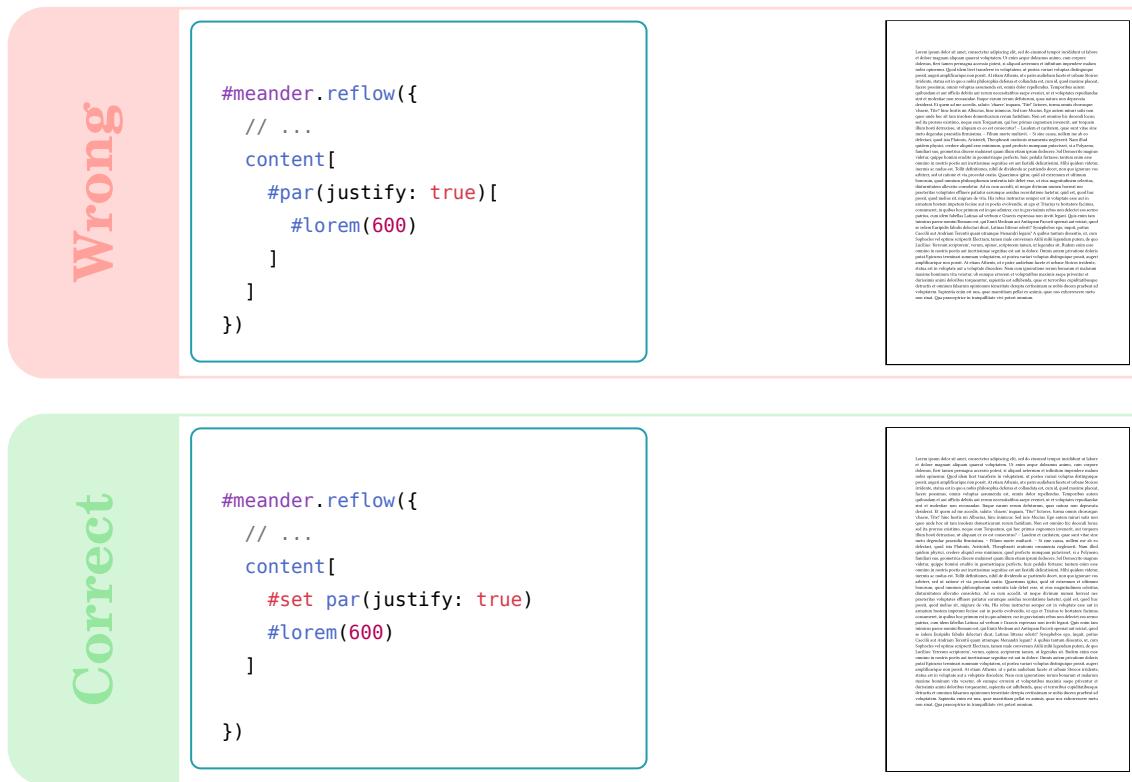
There are however styling parameters that have a consequence on layout, and some of them require special handling. Some of these restrictions may be relaxed or entirely lifted by future updates.

IV.1 Paragraph justification

In order to properly justify text across boxes, `MEANDER` needs to have contextual access to `#par.justify`, which is only updated via a `#set` rule.

As such **do not** use `#par(justify: true)[...]`.

Instead prefer `#[#set par(justify: true); ...]`, or put the `#set` rule outside of the invocation of `#meander.reflow` altogether.



Correct

```
#set par(justify: true)
#meander.reflow({
  // ...
  content[
    #lorem(600)
  ]
})
```

Latin ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit animi et ea modi. Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusamus et iusto odio dignissimos tsariccius.

IV.2 Font size and leading

The font size indirectly affects layout because it determines the spacing between lines. When a linebreak occurs between containers, `MEANDER` needs to manually insert the appropriate spacing there. Since the spacing is affected by font size, make sure to update the font size outside of the `#meander.reflow`. invocation if you want the correct line spacing. Alternatively, `(size)` can be passed as a parameter of `#content` and it will be interpreted as the text size.

Analogously, if you wish to change the spacing between lines, use either a `#set par(leading: 1em)` outside of `#meander.reflow`, or pass `(leading): 1em` as a parameter to `#content`.

Wrong

```
#meander.reflow({
  // ...
  content[
    #set text(size: 30pt)
    #lorem(80)
  ]
})
```

Latin ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit animi et ea modi. Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusamus et iusto odio dignissimos tsariccius.

Correct

```
#set text(size: 30pt)
#meander.reflow({
  // ...
  content[
    #lorem(80)
  ]
})
```

Latin ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit animi et ea modi. Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusamus et iusto odio dignissimos tsariccius.

Correct

```
#meander.reflow({
  // ...
  content(size: 30pt)[

    #lorem(80)
  ]
})
```

Latin text placeholder:

Consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit animus.

IV.3 Hyphenation and language

Hyphenation can only be fetched contextually, and highly influences how text is split between boxes. Language indirectly influences layout because it determines hyphenation rules. To control the hyphenation and language, use the same approach as for the text size: either `#set` them outside of `#meander.reflow`, or pass them as parameters to `content`.

Wrong

```
#meander.reflow({
  // ...
  content[
    #set text(hyphenate: true)
    #lorem(70)
  ]
})
```

Latin text placeholder:

Consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit animus.

Correct

```
#set text(hyphenate: true)
#meander.reflow({
  // ...
  content[
    #lorem(70)
  ]
})
```

Latin text placeholder:

Consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit animus.

Correct

```
#meander.reflow({
  // ...
  content(hyphenate: true)[
    #lorem(70)
  ]
})
```

Latin text placeholder:

Consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit animus.

IV.4 Styling containers

#container accepts a `<style>` dictionary that may contain the following keys:

- `(text-fill)`: the color of the text in this container,
- `(align)`: the left/center/right alignment of content,
- and more to come.

These options have in common that they do not affect layout so they can be applied post-threading to the entire box. Future updates may lift this restriction.

```
#meander.reflow({
    import meander: *
    container(width: 25%,
              style: (align: right, text-fill: blue))
    container(width: 75%,
              style: (align: center))
    container(
      style: (text-fill: red))
    content[#lorem(590)]
})
```



Part V

Multi-page setups

V.1 Pagebreak

`MEANDER` can deal with text that spans multiple pages, you just need to place one or more `#pagebreak` appropriately. Note that `#pagebreak` only affects the obstacles and containers, while `#content` blocks ignore them entirely.

The layout below spans two pages:

- obstacles and containers before the `#pagebreak` go to the first page,
- obstacles and containers after the `#pagebreak` go to the second page,
- `#content` is page-agnostic and will naturally overflow to the second page when all containers from the first page are full.

```
#meander.reflow({
    import meander: *

    placed(top + left, my-img-1)
    placed(bottom + right, my-img-2)
    container()

    pagebreak()

    placed(top + right, my-img-3)
    placed(bottom + left, my-img-4)
    container(width: 45%)
    container(align: right, width: 45%)

    content[#lorem(1000)]
})
```

V.2 Colbreak

Analogously, `#colbreak` breaks to the next container. Note that `#pagebreak` is a *container* separator while `#colbreak` is a *content* separator. The next container may be on the next page, so the right way to create an entirely new page for both containers and content is a `#pagebreak and a #colbreak...` or you could just end the `#meander.reflow` and start a new one.

```

#meander.reflow({
  import meander: *

  container(width: 50%, style: (text-fill: red))
  container(style: (text-fill: blue))
  content[#lorem(100)]
  colbreak()
  content[#lorem(500)]


  pagebreak()
  colbreak()

  container(style: (text-fill: green))
  container(style: (text-fill: orange))
  content[#lorem(400)]
  colbreak()
  content[#lorem(400)]
  colbreak() // Note: the colbreak applies only after the overflow is handled.

  pagebreak()

  container(align: center, dy: 25%, width: 50%, style: (text-fill: fuchsia))
  container(width: 50% - 3mm, margin: 6mm, style: (text-fill: teal))
  container(style: (text-fill: purple))
  content[#lorem(400)]


})

```



V.3 Colfill

Contrary to `#colbreak` which breaks to the next container, `#colfill` fills the current container, *then* breaks to the next container. There is sometimes a subtle difference

between these behaviors, as demonstrated by the examples below. Choose whichever is appropriate based on your use-case.

```
#meander.reflow({
  import meander: *
  container(width: 50%,
    style: (text-fill: red))
  container(
    style: (text-fill: blue))
  content[#lorem(100)]
  colbreak()
  content[#lorem(500)])
})
```

```
#meander.reflow({
  import meander: *
  container(width: 50%,
    style: (text-fill: red))
  container(
    style: (text-fill: blue))
  content[#lorem(100)]
  colfill()
  content[#lorem(300)]
})
```

Recall that filled containers count as obstacles for future containers, so there is a difference between dropping containers and filling them with nothing.

V.4 Placement

Placement options control how a `#meander.reflow` invocation is visible by and sees other content. This is important because `MEANDER` places all its contents, so it is by default invisible to the native layout.

V.4.1 Default

The default, and least opinionated, mode is `(placement)`: [page](#).

- suitable for: one or more pages that `MEANDER` has full control over.
 - advantages: supports `#pagebreak`, several invocations can be superimposed, flexible.
 - drawbacks: superimposed with content that follows.

V.4.2 Inline

The option `(placement): box` will emit non-placed boxes to simulate the actual space taken by the `MEANDER`-controlled layout.

- suitable for: an invocation that is part of a larger page.
- advantages: supports `#pagebreak`, content that follows is automatically placed after.
- drawbacks: cannot superimpose multiple invocations.

V.4.3 Full page

Finally, `(placement): float` produces a layout that spans at most a page, but in exchange it can take the whole page even if some content has already been placed.

- suitable for: single page layouts.
- advantages: gets the whole page even if some content has already been written.
- drawbacks: does not support `#pagebreak`, does not consider other content.

V.4.4 Use-case

Below is a layout that is not (as easily) achievable in `#page` as it is in `#box`. Only text in red is actually controlled by `MEANDER`, the rest is naturally placed before and after. This makes it possible to hand over to `MEANDER` only a few paragraphs where a complex layout is required, then fall back to the native Typst layout engine.

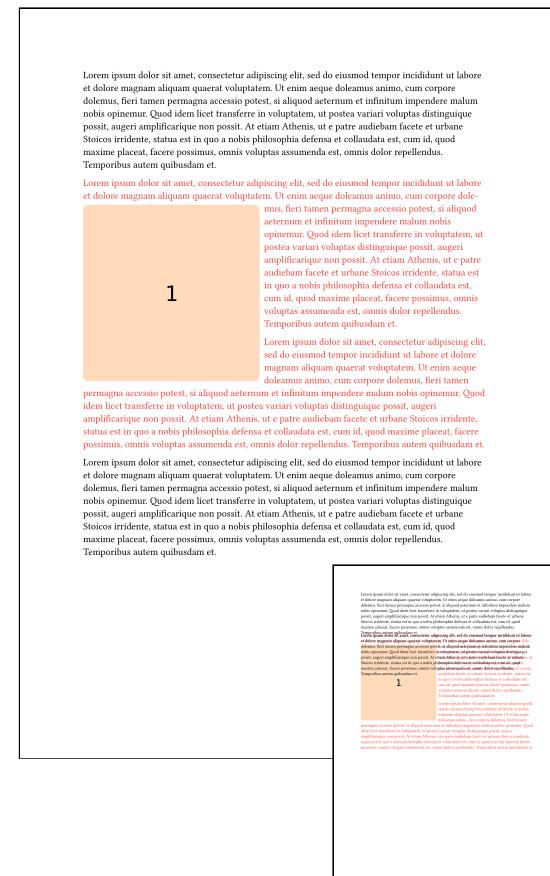
```
#lorem(100)

#meander.reflow(placement: box, {
    import meander: *
    placed(top + left, dy: 1cm,
           my-img-1)
    container()
    content[
        #set text(fill: red)
        #lorem(100)

        #lorem(100)
    ]
}

#lorem(100)
```

For reference, to the right is the same page if we omit `(placement): box`, where we can see a glitchy superimposition of text.



V.5 Overflow

By default, if the content provided overflows the available containers, it will show a warning. This behavior is configurable.

V.5.1 No overflow

The default behavior is `(overflow): false` because it avoids panics while still alerting that something is wrong. The red warning box suggests adding more containers or a `#pagebreak` to fit the remaining text. Setting `(overflow): true` will silently ignore the overflow, while `(overflow): panic` will immediately abort compilation.

`(overflow): false`

```
#meander.reflow(
  overflow: false, {
    import meander: *
    container()
    content[#lorem(1000)]
  })
```



`(overflow): true`

```
#meander.reflow(
  overflow: true, {
    import meander: *
    container()
    content[#lorem(1000)]
  })
```



`(overflow): panic`

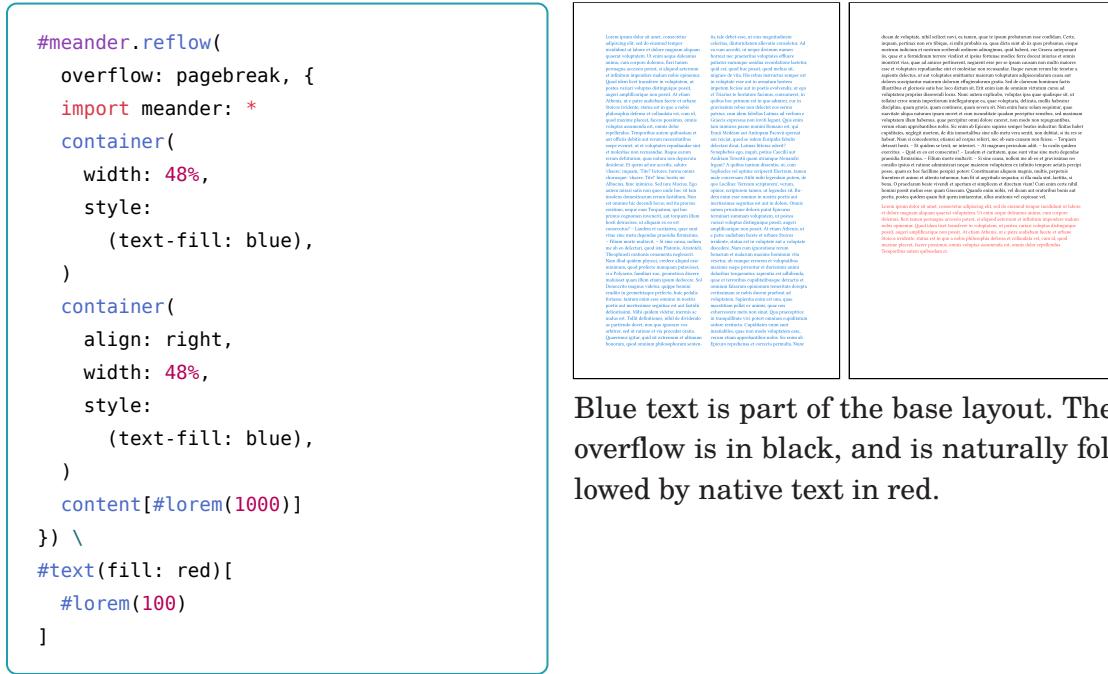
```
#meander.reflow(
  overflow: panic, {
    import meander: *
    container()
    content[#lorem(1000)]
  })
```

(panics)

V.5.2 Predefined layouts

The above options are more useful if you absolutely want the content to fit in the defined layout. A commonly desired behavior is for the overflow to simply integrate with the layout as gracefully as possible. That is the purpose of the two options that follow.

With `<overflow>: pagebreak`, any content that overflows is placed on the next page. This is typically most useful in conjunction with `<placement>: page`, and is outright incompatible with `<placement>: float` (because it does not support `#pagebreak`; see [Section V.4](#)).



As for `<overflow>: text`, it is similarly best suited in conjunction with `<placement>: box`, and simply writes the text after the end of the layout.

```
#text(fill: green)[  
    #lorem(200)  
]  
#meander.reflow(  
    placement: box,  
    overflow: text, {  
        import meander: *  
        container(  
            width: 48%,  
            height: 50%,  
            style:  
                (text-fill: blue),  
        )  
        container(  
            width: 48%,  
            height: 50%,  
            align: right,  
            style:  
                (text-fill: blue))  
        content[#lorem(700)]  
    })  
  
#text(fill: red)[  
    #lorem(200)  
]
```

Long time ago, in a country called Christopher, there was a man named Christopher who had a son named Christopher. This Christopher had a son named Christopher, and so on. One day, Christopher's son Christopher decided to go on a journey to find his father. He traveled for many days and nights, finally reaching a small town where he found a旅館 (旅館). The旅館 was run by an old woman named Mrs. Hotel. She welcomed Christopher and offered him a room for the night. In the morning, Christopher asked Mrs. Hotel if she knew where his father Christopher was. Mrs. Hotel said, "Yes, I do. Your father Christopher is staying at the next旅館." Christopher thanked Mrs. Hotel and continued his journey. After traveling for another day, he reached the next旅館. There, he found his father Christopher sitting at a table, eating breakfast. Christopher ran up to his father and said, "Dad! I've been looking for you for so long!" His father responded, "Well, well, well. If it isn't my son Christopher! Come here and let me give you a hug." They hugged each other tightly. Christopher then asked his father, "Dad, where did you come from?" His father replied, "I came from the旅館 across the street. I was staying there for a few days before I found you." Christopher asked, "What's the旅館 across the street called?" His father said, "It's called the Hotel." Christopher was confused. He thought his father was being playful, so he asked again, "What's the旅館 across the street called?" His father responded, "It's called the Hotel." Christopher realized that his father was serious and asked, "Dad, why are you staying at the Hotel?" His father said, "Because it's the best旅館 in town. The food is delicious, the service is great, and the rooms are comfortable. I highly recommend it to anyone looking for a place to stay." Christopher nodded and said, "Dad, I'm glad you found me. Let's go back to the Hotel together." His father agreed and they both headed back to the Hotel.

In both cases, any content that follows the `#meander.reflow` invocation will more or less gracefully follow after the overflowing text, possibly with the need to slightly adjust paragraph breaks if needed.

V.5.3 Custom layouts

Before resorting to one of these solutions, check if there isn't a better way to do whatever you're trying to achieve. If it really is the only solution, consider [reaching out](#) to see if there is a way to make your desired layout better supported and available to other people.

If your desired output does not fit in the above predefined behaviors, you can fall back to storing it to a state or writing a custom overflow handler. Any function (`overflow`) \rightarrow `content` can serve as handler, including another invocation of `#meander.reflow`. This function will be given as input an object of type `overflow`, which is concretely a dictionary with fields:

- `(styled)` is `content` with all styling options applied and is generally what you should use,
 - `(structured)` is an array of `elem`, suitable for placing in another `#meander.reflow` invocation,

V Multi-page setups

V.5 Overflow

- (raw) uses an internal representation that you can iterate over, but that is not guaranteed to be stable. Use as last resort only.

Similarly if you pass as overflow a state, it will receive any content that overflows in the same 3 formats, and you can use state.get() on it afterwards.

For example here is a handler that adds a header and some styling options to the text that overflows:

```
#meander.reflow(  
  placement: box,  
  overflow: tt => [  
    #set text(fill: red)  
    #text(size: 25pt)[  
      *The following content overflows:  
    ]  
    _#{tt.styled}_  
  ], {  
  import meander: *  
  container(height: 50%)  
  content[#lorem(400)]  
})
```

And here is one that stores to a state to be retrieved later:

```
#let overflow = state("overflow")
#meander.reflow(
  placement: box,
  overflow: overflow, {
    import meander: *
    container(height: 50%)
    content[#lorem(400)]
  })
}

#set text(fill: red)
#text(size: 25pt) [
  *The following content overflows:*
]
_#{context overflow.get().styled}_
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed etiam tempus incidentia latibus et dolore magna aliquam quaerat voluptem. Ut enim admodum temporis enim, corpora dolorum, facti sunt per se praeceps potest, aliquid uterum et infinitus habet interne malum quod non possit esse. Quod est in aliis, non potest esse in meo. Non potest esse, posse, auctor amplificante non posse. At etiam Aeneas, et a patre audire facta et urbanus Strosus iratus erat, et in quo nihil philosophia defensio et defendit, et cum illi, quod nesciunt, nesciunt, et quod nesciunt, nesciunt, et quod nesciunt, nesciunt. Temporebus autem quibusdam et officia debitis et rem necessestis superesse, et ut voluptate regnandi aut et meditacione non recessum, haec rem ruram defensio, quod nesciunt, nesciunt, et quod nesciunt, nesciunt, et quod nesciunt, nesciunt, et quod nesciunt, omnes chevassit. Tunc hic homines Alius haec nesciuit, sed facie Mus. Ite agnozim, non satis nisi uno quee hoc in me involem domescitur rem futhism. Non est uterum de identitate, sed uterum de natura, uterum de Tergapam, qui his primis cogitationis annis, non potest esse. Quod est in aliis, non potest esse in meo. Ut et certum, quod sunt sine meo deinde praesumti fuisse. Tunc nomen multum. Si tunc, nomine meo de eodem, istud quod ista Philos. Antiqu. Theophrast. ostendit, ceteris omnibus etiam deinde, non potest esse in meo. Non potest esse, posse, auctor amplificante non posse. Et Polymathus familius, quippe domino dulces malassunt quod enim ipsum eum posse. De Melpomene familius, quippe domino dulces malassunt quod enim ipsum eum posse. Deinde, quod non potest esse in meo, non potest esse, posse, auctor amplificante non posse. Mili quidam volent, nemus et sedas, et ut ratione et via proscripta oratio. Querimus ergo, quod sit extenuatio et dilatatio, quid potest esse in meo, non potest esse, posse, auctor amplificante non posse. Dilectio, dilectionem deponimus. Et si cum accedit, ut patrum, cum.

The following content overflows:

domesticorum hominum patrumque similitudinem patrum nostri hominumque domesticorum patrum, quod haec posset, quod nullus sit dignus de ipso. Haec res vestra intercessio est in scilicet ut ea in armentum hominis impetrare et in post evanescere, et ut ego et Terminus et fortunae, patrum, quod nullus est prius et cum, et quod genitrix vestra potest esse delectio et ornata, cum.

Use in moderation. Chaining multiple of these together can make your layout diverge.

See also an answer I gave to [issue #1](#) which demonstrates how passing a `#meander.reflow` layout as overflow handler can achieve layouts not otherwise supported. Use this only as a last-resort solution.

Part VI

Inter-element interaction

[MEANDER](#) allows attaching tags to elements. These tags can then be used to:

- control visibility of obstacles to other elements,
- apply post-processing style parameters,
- position an element relative to a previous one,
- measuring the width or height of a placed element.

More features are planned, including

- additional styling options,
- default parameters controlled by tags.

Open a [feature request](#) if you have an idea of a behavior based on tags that should be supported.

You can put one or more tags on any obstacle or container by adding a parameter `(tags)` that contains a `label` or an array of `label`. For example:

- `placed(..., tags: <A>)`
- `container(..., tags: (, <C>))`

VI.1 Locally invisible obstacles

By passing one or more tags to the parameter `(invisible)` of `container(...)`, you can make it unaffected by the obstacles in question.

```
#meander.reflow({
    import meander: *
    placed(
        top + center,
        my-img-1,
        tags: <x>,
    )
    container(width: 50% - 3mm)
    container(
        align: right,
        width: 50% - 3mm,
        invisible: <x>,
    )
    content[#lorem(600)]
})
```

Latinum, ut neque divinum nomen horret nec
peracteris voluptatis officere palatii eurymae
assidua recitatione hæcatur, quid est, quod hæc
positi, quod metus sit, migrare de vita His
rebus, et in secessu, ut in secessu exire
et in irratione hæc impetrare possit, in
potius evolvens, ut ego et Tauris te hortatore
facimus, consumetur, in quibus hoc primum est in
quibusq[ue] gravissima rebus non detectet
sunt, ut serua patrum idem, Latini, Laticorni,
verbum a Graecis expressum non invia legant.
Quis enim tam imicus paucis nominis Romanus est,
qui Ennius Medeum aut Antiochum Faucii
spem aut reicit, quod se idem Euripidis
et Ovidii, et aliorum, etiam si quis
Synephobus ego, inquit, potius Cœcilius aut An-
dreas Terentii quam oratione Menandri legant?
A quibusq[ue] dissensito, ut, cum Sophocles vel
optime scriptore Eleutherio, et quibusq[ue]
scriptoribus multis legimus, quoniam potius de locis
'terram scriptorum', verum, opinor, scriptorum
tamen, ut legendos sit. Rudem enim esse omnino
in nos possumus aut ineritissimae segnitiae est
in deo. Quis autem, inquit, non credat
ut Epicus terminus summae voluptatem
ut postea variata voluptas distinguenda possit,
angari amplificarique non possit. At etiam Athene,
ut p[ro]p[ter]a dicitur, et p[ro]p[ter]a et voluptate
discere, non statim et in voluptate aut in voluptate
discere. Nam enim ignorantes rerum bonarum
et malarum maxime hominis vita vexatur, ob
eumque etiam et voluptatibus omnes saepius
procedunt et dantur, nihil enim illud possit
ut supponit et abhinc, quas et terribus
equidistantibus detracit et omnium falarum
opiniorum temeritate derupta certissimam se
possit, ut p[ro]p[ter]a prædictum ad voluptatem. Sapientia
enim est anima, quia multitudinem pellit ex animis,
quae nos ciboserveare metu non statit. Quia pre-
ceptio in tranquillitate vix potest omnium.

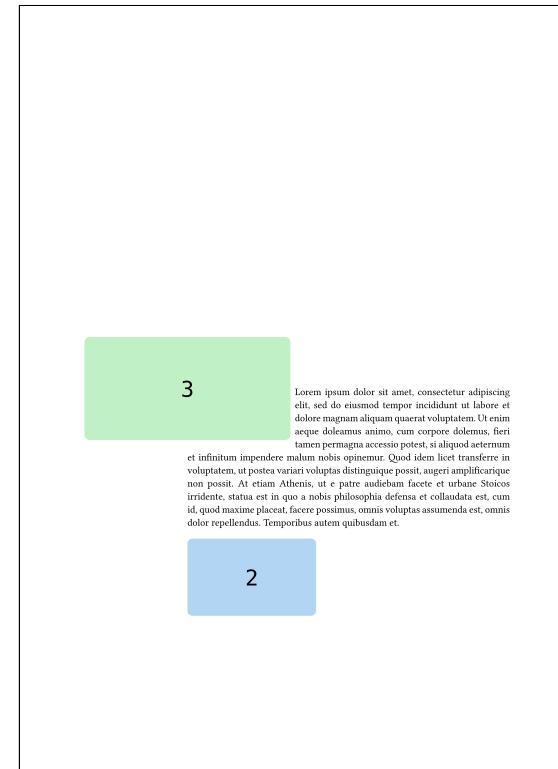
This is already doable globally by setting (boundary) to `#contour.phantom`. The innovation of (invisible) is that this can be done on a per-container basis.

VI.2 Position and length queries

The module `#query` contains functions that allow referencing properties of other elements. For example:

- whenever an `align` is required, such as for `#placed` or `#container`, you can instead pass a location dynamically computed via `#query.position`.
- whenever a `length` is required, such as for `(dx)` or `(height)` or a similar parameter, you can instead pass a length dynamically computed via `#query.height` or `#query.width`.

```
#meander.reflow({
  import meander: *
  placed(
    left + horizon,
    my-img-3,
    tags: <a>,
  )
  container(
    align: query.position(
      <a>, at: center),
    width: query.width(
      <a>, transform: 150%),
    height: query.height(
      <a>, transform: 150%),
    tags: <b>,
  )
  placed(
    query.position(
      <b>, at: bottom + left),
    anchor: top + left,
    dx: 5mm,
    my-img-2,
  )
  content[#lorem(100)]
})
```



In this example, after giving an absolute position to one image, we create a container with position and dimensions relative to the image, and place another image immediately after the container ends.

VI.3 A nontrivial example

Here is an interesting application of these features. The `#placed` obstacles all receive a tag `<x>`, and the second container has `(invisible): <x>`. Therefore the `#placed` elements count as obstacles to the first container but not the second. The first container is immediately filled with empty content and counts as an obstacle to the second container. The queries reduce the amount of lengths we have to compute by hand.

```
#meander.reflow({
  import meander: *
  let placed-below(
    tag, img, tags: (),
  ) = {
    placed(
      // fetch position
      // of previous elem.
      query.position(tag, at: bottom + left),
      img, tags: tags,
      // correct for margins
      dx: 5pt, dy: -5pt,
    )
  }
  // Obstacles
  placed(left, my-img-1, tags: (<x>, <a1>))
  placed-below(<a1>, my-img-2, tags: (<x>, <a2>))
  placed-below(<a2>, my-img-3, tags: (<x>, <a3>))
  placed-below(<a3>, my-img-4, tags: (<x>, <a4>))
  placed-below(<a4>, my-img-5, tags: <x>)

  // Occupies the complement of
  // the obstacles, but has
  // no content.
  container(margin: 6pt)
  colfill()

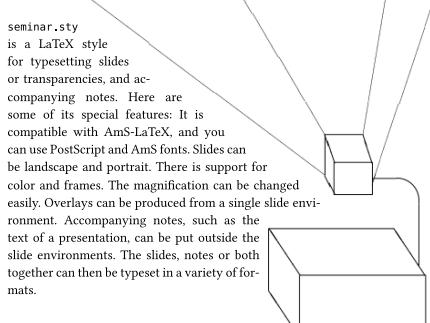
  // The actual content occupies
  // the complement of the
  // complement of the obstacles.
  container(invisible: <x>)
  content[
    #set par(justify: true)
    #lorem(225)
  ]
})
```

Lorem ipsum dolor sit amet, consecetur adipiscing elit, sed ei duosum tempor incidit ut labore et dolore magna aliquam quaerat voluptatem. Ut enim acque doleamus animo, cum corpore dolens, fieri tamen permagna accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinemur. Quod ¹ idem licet transference in voluptatem, ut postea variari voluntas distinguere possit, augeri amplificarique non possit. At etiam Athenis, ut e patre audiebam facete et urbano Stoicos irridente, statua est in quo a nobis philosophia defensa et collaudata est, cum id, quod maxime placeat, facere possimus, omnis voluntas assumenda est, omnis dolor repellendum. Temporibus autem quibusdam ² et ab officiis debitis aut rerum necessitatibus saepe eveniet, ut et voluntates repudiandae sint et molestiae non recusandae. Itaque earum rerum defuturum, quas natura non depravata desiderat. Et quem ad amendam, saluto: 'chaere, inquam, Tite!' ³Dores, turma omnis choruscus: 'chaere, Tite!' hinc hostis mi Albucius, hinc inimicus. Sed iure Mucius. Ego autem mirari satis non quo queo unde hoc sit tam insolens domesticarum rerum fastidium. Non est omnino hic docendi locus; sed ita prouersus existimo, neque eum Torquatum, qui hoc primus cognomen invenerit, aut torquem illum hosti detraxisse, ut alii ⁴nam ex eo est consecutus? - Laudem et caritatem, quae sunt vitae sine metu degendae praesidia firmissima. - Filium morte multavit. - Si sine causa, nollem me ab eo delectari, quod ista Platonis, Aristotelis, ⁵Heophrasti orationis ornamenta.

Part VII

Showcase

A selection of nontrivial examples of what is feasible, inspired mostly by requests on issue #5181. You can find the source code for these on the [repository](#).



examples/5181-a/main.typ

Motivated by [github:typst/typst #5181](https://github.com/typst/typst/pull/5181) (a)

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua
voluptatem. Ut enim aequo dolorem animo, cum corpore dolo, fieri tamen pernagatio accessit potest, si aliquid esterum et
infinitum imponere madum nobis opinemur. Quod idem licet transferre in voluptam, ut postea variari voluptas distinguuntur possit,
augeri amplericante non possit. Etiam Athenis, ut et patre audiebam facete et urbano Stoicos irridente, statua est in quo a nobis
philosophia defens et collaudata est, cum id maxime placuisse, facere omnissimus possimus voluntatis assumenda est, omnis moralis
repellendus. Temporibus autem quibusdam et operis debitis ut rerum necessitatibus saepe evenit, ut et voluptates repudiandae
sunt et molestiae non recusandas. Itaque etiam rerum deficitus, quas natura non depravata deserpat. Et quem ad me accedit, saluto
chaerè, inquam, "Tite!" lectores, tanta omnis chosue: "chaerè, Tite!" hinc hostis mihi Albucius, hinc innatus. Sed nunc Mucius. Ego
autem mirari satis quo unde hoc sit iam insolens domesticarum rerum fastidium. Non est omnino hic docendi locus; sed
proposito ex eo est pessimo, neque cum Troquatum, qui hoc primus cognovit, inquit, illum hosti detrahebisse, ut aliquam ex eo est
concessutus? - Laudem et caritatem, sicut vult sine mea degenera praesidia firmissima. - Filium mure multavit. - Si causa mea
nollem ac me ad eoelectari, quid ista Platonis, Aristotelis, Theophrasti orationis ornamenti neglexit. Nam illud quod
dem physici, credere aliud esse minimum, quod profecto nunquam putavisset, si a Polyaeno, familiari suo
metrica discere maluerat quam illius etiam pietatis dedecore. Sol Democritus magnum videtur, quippe hominem eru-
ditio in geometriam perfecto, hinc pedalis fortasse, tandem tamen esse omnino in nostra poetae
intermissione segnitissim est ad fastidii delicians. Mihhi quidem videtur, nemisis ac iudicis est. Tollit definitiones,
nilid de dividendo ac partendo docet, non quod ignorare vos arbitrat, sed ut ratione via pro-
cedat oratio. Quiescitur igit, quid sit extremum et ultimum bonorum, quod omnium philosophorum
sententia tale debet esse, ut eius magnitudinem celeritas, diuturnitatem allevatio consuleat. Ad
eum accedit, ut neque dinum nimis horreat ne praeclaritas voluptates effluere patitur
caraque assidua recordatione laetetur, quid est, quod huius possit, quid melius sit, migrae
vita. His rebus instituta semper est in voluptate esse aut in ardentum hostem impetu
lecesse aut in poenis evolvens, ut ego et Triarius te hortatore facimus, consumetur,
in quibus hoc primus est in quo admir, cur in gravissimis rebus non detecto eos sermo
patrus, cum idem fabella Latianus ad verbum et Gracchus expressus non inviti legant: Quis
enim tam innipiens paene nomin Romani est, qui Ennius Medeum aut Antipham
Pacuvia scripsit aut reicit, quod si eadem Ennius fabella detectari dicat, Quis
Latianus litteras erit? Symbophos ergo, inquit potius Caccili et Andram Terentii quam
utramque Membrana legam? qibus tantum dissentio, ut, cum Sophecola vel

examples/5181-b/main.typ

Motivated by [github:typst/typst #5181](#) (b)

VII Showcase

Talmudifier Test Page

Quisque nisi
nec faci-
mentum hoc. Pe-
titi sagittis
laesit legumen-
tum. Aliquam feugiat
id maledicatur.
hodier eros
pudinaria. Cui-
ciliis ut tincidunt
ta eu libero. A
incipit nisi. Li-
tus lacris, tristis
non, tempus id
lum ante ipsum
cibus orci luctu-
sus cubilia
porta vel, qui
erit. Et R. Quisque
sit amet justo

Ali-
quiam feugiat
huius turpis id maledicatur. Su-
spendisse sit amet tempor pudinaria.
Duis velit mauris, facilis ut tincidunt, pharetra
eu libero. Aenanc lobortis tincidunt nisi. Praesent
met lucus, tristique sed porta non, tempus id
lum ante ipsum
cibus orci luctu-
sus cubilia
porta vel, qui
erit. Et R. Quisque
sit amet justo

Et. Duis vehicula ligula et bibendum, in ele-
fient dictum. Etiam sit amet tellus id ex ullamcor-
faucibus. Suspendisse sit elut vel neque convallis iac-
ulis id in urna. Sed tincidunt
ipsius at seculeris. Phasel-
ius lacris, sedatae sit amet
occi in, rutrum malesuada diam.
Cras pulvinar sit amet la-
cibus fringilla, in elementum mauris
maximus. Phasellus euismod
sed pretium elementum. Nulla
sagittis, elit eget semper
portitor, erat nunc commodo tempus,
et bibendum ex lorem laoreet ip-
sum. Morbi auctor dignissim
egit etiam. Ut enim sed: bland bius
blab. It is a blab. *Aenean*
hacimtus id diam, sed
metus aliquet us. Sed non hoven
qui duis ultrices voluptat qui at
diam. *Lorem* *duis nec* *Quisque* at nisi
vel fermentum eros. Pelletentesque
henderit sagittis vulputate. Fusce
laoreet malesuada odio, sit amet
fringilla lectus ultrices porttitor. Ali-
quiam feugiat
huius turpis id maledicatur. Su-
spendisse sit amet tempor pudinaria.
Duis velit mauris, facilis ut tincidunt, pharetra
eu libero. Aenanc lobortis tincidunt nisi. Praesent
met lucus, tristique sed porta non, tempus id
lum ante ipsum
cibus orci luctu-
sus cubilia
porta vel, qui
erit. Et R. Quisque
sit amet justo

Et. Duis vehicula ligula et bibendum, in ele-
fient dictum. Etiam sit amet tellus id ex ullamcor-
faucibus. Suspendisse sit elut vel neque convallis iac-
ulis id in urna. Sed tincidunt
ipsius at seculeris. Phasel-
ius lacris, sedatae sit amet
occi in, rutrum malesuada diam.
Cras pulvinar sit amet la-
cibus fringilla, in elementum mauris
maximus. Phasellus euismod
sed pretium elementum. Nulla
sagittis, elit eget semper
portitor, erat nunc commodo tempus,
et bibendum ex lorem laoreet ip-
sum. Morbi auctor dignissim
egit etiam. Ut enim sed: bland bius
blab. It is a blab. *Aenean*
hacimtus id diam, sed
metus aliquet us. Sed non hoven
qui duis ultrices voluptat qui at
diam. *Lorem* *duis nec* *Quisque* at nisi
vel fermentum eros. Pelletentesque
henderit sagittis vulputate. Fusce
laoreet malesuada odio, sit amet
fringilla lectus ultrices porttitor. Ali-
quiam feugiat
huius turpis id maledicatur. Su-
spendisse sit amet tempor pudinaria.
Duis velit mauris, facilis ut tincidunt, pharetra
eu libero. Aenanc lobortis tincidunt nisi. Praesent
met lucus, tristique sed porta non, tempus id
lum ante ipsum
cibus orci luctu-
sus cubilia
porta vel, qui
erit. Et R. Quisque
sit amet justo

Aenean sed dolor suscipit, dignissimus ligat, blandi
eros. Pelletentesque scelerisque viverra nisl, at blandi
congue lorem semper non. Nulla nec convallis
neque Donec ut velit. Donec felis odio, tincidunt
non vestibulum ut, consetetur
egestet lectus. Donec varus finibus
scelerisque. Aliquam eget sem non, tincidunt
sollicitudin felis. Curabitur et ullam-
corporis lacus. Cras eu ante quis
aut dictum ultrices. Proin vel atque
ut id sollicitudin autor. Nullam
ultricies tempor neque, varius
scelerisque neque. Nam et arcu
ut odio maximus tempor et sit
amet elit. *Ror Mörbi fermentum*
dabipsum elementum. Proin id metus
ipsum. Aenean pescus nunc quis
lacus varius, erat molestie mauris.
Aliquam erat volutpat. Quisque
ac venenatis a tincidunt vel, dignissimus
ut mi. Morbi id velit ut turpis alli-
mentum. Curabitur hacida. *Habendum tel-*
lus viae cras rutrum scelerisque.
Vivamus et palepellente est, non
imperedit massa. Cumbar dictum
nisi sollicitudin luctus malesuada.

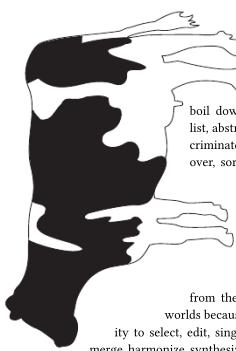
Vestibulum ac nunc dolor, sit amet ornare elec-
tum. Etiam id dolor. *RN* In ac velit maximus elec-
tum ex, blandi massa. Aliquam vehicula
at neque sit amet ultrices. Integre id justo est
Quisque luctus erat etiam aliquam faucibus. Vivamus
et mi ac odio pretium dictum. Vestibulum vivamus
congue risus, et acegas est dapibus eti. Aenean
ut ore leo. Nulla dignissim erat pulvinar elit
facilisis, ac venenatis leo tincidunt. Quisque ut
lorem tortor. Quisque nec portitor elit. Ut finibus
ullancorpora odio, in portitor lorem suscipit ut.

et nisl blandit, efficiunt odio vittus, dictum commu-
nione, efficiunt effector istribo libero, eget commu-
nione, consequentem equalitatem magna: *tempus#68&92;#68&92;*
get purus lectus. > Checks out how nice that little
venerans nient nisi tempus fringilla. Vivamus
habet. Integre ac utrue a lectus fringilla mattis ac id
portitor quis. Donec ut ante, semper non quam
finibus si amet felis ut, vulputate euismod nunc.

examples/talmudifier/main.typ

From [github:subalterngames/talmudifier](https://github.com/subalterngames/talmudifier)

Motivated by [github:typst/typst #5181](https://github.com/typst/typst/pull/5181) (c)



A black silhouette of a sheep's head and neck facing right, with white text floating around it.

We thrive in information-thick worlds because of our marvelous and everyday capacity to select, edit, single out, structure, highlight, group, pair, merge, harmonize, synthesize, focus, organize, condense, reduce, boil down, choose, categorize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synopsize, winnow the wheat from the chaff and separate the sheep from the goats. We thrive in information-thick worlds because of our marvelous and everyday capacity to select, edit, single out, structure, highlight, group, pair, merge, harmonize, synthesize, focus, organize, condense, reduce, boil down, choose, categorize, catalog, classify, list, abstract, scan, look into, idealize, iso-

examples/cow/main.typ

Motivated by “Is there an equivalent to LaTeX’s \parshape?” (Typst forum)

Part VIII

Public API

These are the user-facing functions of MEANDER.

VIII.1 Elements

All constructs that are valid within a `#meander.reflow({ ... })` block. Note that they all produce an object that is a singleton dictionary, so that the `#meander.reflow({ ... })` invocation is automatically passed as input the concatenation of all these elements. For clarity we use the more descriptive type `elem`, instead of the internal representation (`dictionary`,)

| | | |
|------------------------|-------------------------|-------------------------|
| <code>#colbreak</code> | <code>#container</code> | <code>#pagebreak</code> |
| <code>#colfill</code> | <code>#content</code> | <code>#placed</code> |

↑ Since 0.2.2

`#colbreak` → `elem`

Continue content to next container. Has the same internal fields as the output of `#content` so that we don't have to check for key `in elem` all the time.

↑ Since 0.2.3

`#colfill` → `elem`

Continue content to next container after filling the current container with whitespace.

```
#container(  
    {align}: top + left,  
    {dx}: 0% + 0pt,  
    {dy}: 0% + 0pt,  
    {width}: 100%,  
    {height}: 100%,  
    {style}: (:),  
    {margin}: 5mm,  
    {invisible}: (),  
    {tags}: ()  
) → elem
```

Core function to create a container.

— Argument —

```
{align}: top + left
```

Location on the page or position of a previously placed container.

— Argument —

```
{dx}: 0% + 0pt
```

relative

Horizontal displacement.

— Argument —

`(dy): 0% + 0pt`

relative

Vertical displacement.

— Argument —

`(width): 100%`

relative

Width of the container.

— Argument —

`(height): 100%`

relative

Height of the container.

— Argument —

`(style): ()`

dictionary

↑ Since 0.2.2 Styling options for the content that ends up inside this container. If you don't find the option you want here, check if it might be in the `(style)` parameter of `#content` instead.

- `align: flush text left/center/right`
- `text-fill: color of text`

— Argument —

`(margin): 5mm`

length | dictionary

Margin around the eventually filled container so that text from other paragraphs doesn't come too close. Follows the same convention as `#pad` if given a dictionary (`x, y, left, right, rest`, etc.)

— Argument —

`(invisible): ()`

label | array(label)

One or more labels that will not affect this element's positioning.

— Argument —

`(tags): ()`

label | array(label)

↑ Since 0.2.3 Optional set of tags so that future element can refer to this one and others with the same tag.

`#content({size}: auto, {lang}: auto, {hyphenate}: auto, {leading}: auto)[data]`

→ flowing

Core function to add flowing content.

— Argument —

`(data)`

content

Inner content.

↑ Since 0.2.2

— Argument —

`(size): auto`

`length`

Applies `#set text(size: ...)`.

↑ Since 0.2.2

— Argument —

`(lang): auto`

`str`

Applies `#set text(lang: ...)`.

↑ Since 0.2.2

— Argument —

`(hyphenate): auto`

`bool`

Applies `#set text(hyphenate: ...)`.

↑ Since 0.2.2

— Argument —

`(leading): auto`

`length`

Applies `#set par(leading: ...)`.

↑ Since 0.2.1

#pagebreak → obstacle

Continue layout to next page.

```
#placed(
  (align),
  (dx): 0% + 0pt,
  (dy): 0% + 0pt,
  (boundary): (auto,),
  (display): true,
  (tags): (),
  (anchor): auto
)[content] → elem
```

Core function to create an obstacle.

— Argument —

`(align)`

`align` | `position`

Reference position on the page or relative to a previously placed object.

— Argument —

`(dx): 0% + 0pt`

`relative`

Horizontal displacement.

— Argument —

`(dy): 0% + 0pt`

`relative`

Vertical displacement.

— Argument —

`(boundary): (auto,)`

`contour`

An array of functions to transform the bounding box of the content. By default, a `5pt` margin. See [Section III](#) and [Section VIII.3](#) for more information.

Argument —

`(display): true`

`bool`

Whether the obstacle is shown. Useful for only showing once an obstacle that intersects several invocations. Contrast the following:

- `(boundary)` set to `#contour.phantom` will display the object without using it as an obstacle,
- `(display): false` will use the object as an obstacle but not display it.

Argument —

`(content)`

`content`

Inner content.

Argument —

`(tags): ()`

`label | array(label)`

Optional set of tags so that future element can refer to this one and others with the same tag.

Argument —

`(anchor): auto`

`auto | align`

Anchor point to the alignment. If `auto`, the anchor is automatically determined from `(align)`. If an alignment, the corresponding point of the object will be at the specified location.

VIII.2 Layouts

These are the toplevel invocations. They expect a sequence of `elem` as input, and produce `content`.

`#meander.reflow` `#meander.regions`

`#meander.reflow((seq), (debug): false, (overflow): false, (placement): page) → content`

Segment the input sequence according to the tiling algorithm, then thread the flowing text through it.

Argument —

`(seq)`

`array(elem)`

See [Section VIII.1](#) for how to format this content.

Argument —

`(debug): false`

bool

Whether to show the boundaries of boxes.

↑ Since 0.2.1

Argument —

`(overflow): false`

any

Controls the behavior in case the content overflows the provided containers.

- `false` → adds a warning box to the document
- `true` → ignores any overflow
- `#pagebreak` → the text that overflows is placed on the next page
- `#text` → the text that overflows is placed on the same page
- `#panic` → refuses to compile the document
- a `state` → stores the overflow in the state. You can then `_.get()` it later.
- any function (`overflow`) → `content` → uses that for formatting

↑ Since 0.2.2

Argument —

`(placement): page`

any

Relationship with the rest of the content on the page.

- `#page`: content is not visible to the rest of the layout, and will be placed at the current location. Supports pagebreaks.
- `#box`: meander will simulate a box of the same dimensions as its contents so that normal text can go before and after. Supports pagebreaks.
- `#float`: similar to page in that it is invisible to the rest of the content, but always placed at the top left of the page. Does not support pagebreaks.

`#meander.regions({seq}, {display}: true, {placement}: page, {overflow}: none) → content`

Debug version of the toplevel reflow, that only displays the partitioned layout.

Argument —

`(seq)`

array(elem)

Input sequence to segment.

Argument —

`(display): true`

bool

Whether to show the placed objects (`true`), or only their hitbox (`false`).

↑ Since 0.2.2

Argument —

`(placement): page`

any

Controls relation to other content on the page. See analogous `(placement)` option on `#meander.reflow`.

[↑] Since 0.2.1

— Argument —
{overflow}: `none`
 Ignored.

VIII.3 Contouring

Functions for approximating non-rectangular boundaries. We refer to those collectively as being of type `contour`. They can be concatenated with + which will apply contours successively.

| | | |
|---------------------------------|-------------------------------|-----------------------------|
| <code>#contour.ascii-art</code> | <code>#contour.horiz</code> | <code>#contour.vert</code> |
| <code>#contour.grid</code> | <code>#contour.margin</code> | <code>#contour.width</code> |
| <code>#contour.height</code> | <code>#contour.phantom</code> | |

[↑] Since 0.2.1

`#contour.ascii-art({ascii}) → contour`

Allows drawing the shape of the image as ascii art.

Blocks

- "#": full
- " ": empty

Half blocks

- "[": left
- "]": right
- "^": top
- "_": bottom

Quarter blocks

- "\\"": top left
- "\)": top right
- ",": bottom left
- ".": bottom right

Anti-quarter blocks

- "J": top left
- "L": top right
- "7": bottom left
- "F": bottom right

Diagonals

- "/": positive
- "\": negative

— Argument —

`{ascii}`

`code` | `str`

Draw the shape of the image in ascii art.

#contour.grid({div}: 5, {fun}) → contour

Cuts the image into a rectangular grid then checks for each cell if it should be included. The resulting cells are automatically grouped horizontally.

Argument —

{div}: 5

int | (x: int, y: int)

Number of subdivisions.

Argument —

{fun}

function

Returns for each cell whether it satisfies the 2D equations of the image's boundary.

(fraction, fraction) → bool

#contour.height({div}: 5, {flush}: horizon, {fun}) → function

Vertical segmentation as (anchor, height).

Argument —

{div}: 5

int

Number of subdivisions.

Argument —

{flush}: horizon

align

Relative vertical alignment of the anchor.

Argument —

{fun}

function

For each location, returns the position of the anchor and the height.

(fraction) → (fraction, fraction)

#contour.horiz({div}: 5, {fun}) → contour

Horizontal segmentation as (left, right)

Argument —

{div}: 5

int

Number of subdivisions.

Argument —

{fun}

function

For each location, returns the left and right bounds.

(ratio) → (ratio, ratio)

`#contour.margin(..{args}) → contour`

Contouring function that pads the inner image.

Argument

`..{args}`

May contain the following parameters, ordered here by decreasing generality and increasing precedence

- `(length)`: `length` for all sides, the only possible positional argument
- `(x), (y)`: `length` for horizontal and vertical margins respectively
- `(top), (bottom), (left), (right)`: `length` for single-sided margins

`#contour.phantom → contour`

Drops all boundaries. Having as `(boundary)` a `#contour.phantom` will let other content flow over this object.

`#contour.vert({div}: 5, {fun}) → contour`

Vertical segmentation as `(top, bottom)`

Argument

`{div}: 5`

`int`

Number of subdivisions.

Argument

`{fun}`

`function`

For each location, returns the top and bottom bounds.

`(fraction)→(fraction , fraction)`

`#contour.width({div}: 5, {flush}: center, {fun}) → contour`

Horizontal segmentation as `(anchor, width)`.

Argument

`{div}: 5`

`int`

Number of subdivisions.

Argument

`{flush}: center`

`align`

Relative horizontal alignment of the anchor.

Argument

`{fun}`

`function`

For each location, returns the position of the anchor and the width.

`(fraction)→(fraction , fraction)`

VIII.4 Queries

Enables interactively fetching properties from previous elements. See how to use them in [Section VI](#).

| | | |
|----------------------------|------------------------------|---------------------------|
| <code>#query.height</code> | <code>#query.position</code> | <code>#query.width</code> |
|----------------------------|------------------------------|---------------------------|

↑ Since 0.2.3

`#query.height({tag}, {transform}: 100%) → query(length)`

Retrieve the height of a previously placed and labeled element. If multiple elements have the same label, the resulting height is the maximum left-to-right span.

— Argument —

`(tag)`

`label`

Reference a previous element by its tag.

— Argument —

`{transform}: 100%`

`ratio | function`

Apply some post-processing transformation to the value.

`#query.position({tag}, {at}: center) → query(location)`

↑ Since 0.2.3

Retrieve the location of a previously placed and labeled element. If multiple elements have the same label, the position is relative to the union of all of their boxes.

— Argument —

`(tag)`

`label`

Reference a previous element by its tag.

— Argument —

`{at}: center`

`align`

Anchor point relative to the box in question.

`#query.width({tag}, {transform}: 100%) → query(length)`

↑ Since 0.2.3

Retrieve the width of a previously placed and labeled element. If multiple elements have the same label, the resulting width is the maximum top-to-bottom span.

— Argument —

`(tag)`

`label`

Reference a previous element by its tag.

— Argument —

`{transform}: 100%`

`ratio | function`

Apply some post-processing transformation to the value.

VIII.5 Std

Some builtin functions or types are shadowed by `MEANDER`'s definitions. This module allows you to still access them.

#pagebreak

content

Use `#std.pagebreak()` if an `#import meander: *` has shadowed the builtin `#pagebreak`.

#colbreak

content

Use `#std.colbreak()` if an `#import meander: *` has shadowed the builtin `#colbreak`.

#content

type

Use `std.content` if an `#import meander: *` has shadowed the builtin `content`.

#grid

function

Use `#std.grid(..)` if an `#import meander.contour: *` has shadowed the builtin `#grid`.

#query

function

Use `#std.query(..)` if an `#import meander: *` has shadowed the builtin `#query`.

VIII.6 Public internals

If `MEANDER` is too high-level for you, you may use the public internals made available as lower-level primitives.

Public internal functions have a lower standard for backwards compatibility. Make sure to pin a specific version.

```
#import "@preview/meander:0.2.4": internals.fill-box
```

↑ Since 0.2.4

This grants you access to the primitive `fill-box`, which is the entry point of the content bisection algorithm. It allows you to take as much content as fits in a specific box. See `#bisect.fill-box` for details.

```
#import "@preview/meander:0.2.4": internals.geometry
```

↑ Since 0.2.4

This grants you access to all the functions in the `geometry` module, which implement interesting 1D and 2D primitives. See [Section IX.2](#) for details.

Part IX

Internal module details

IX.1 Utils

```
#utils.apply-styles           #utils.coerce-to-array
```

```
#utils.apply-styles(({size): auto, (lang): auto, (hyphenate): auto, (leading): auto)[data] → content
```

Applies some of the standard styling options that affect layout and therefore are stored separately in our internal representation.

| | |
|------------------------------------|---------|
| Argument — | |
| (data) | content |
| Text to style. | |
| Argument — | |
| (size): auto | length |
| Applies #set text(size: ...). | |
| Argument — | |
| (lang): auto | str |
| Applies #set text(lang: ...). | |
| Argument — | |
| (hyphenate): auto | bool |
| Applies #set text(hyphenate: ...). | |
| Argument — | |
| (leading): auto | length |
| Applies #set par(leading: ...). | |

```
#utils.coerce-to-array((t)) → array(T)
```

Interprets a single element as a singleton.

| | |
|------------------|--------------|
| Argument — | |
| (t) | T array(T) |
| Element or array | |

IX.2 Geometry

| | | |
|---------------------------|---------------------|----------------------|
| #geometry.align | #geometry.clamp | #geometry.intersects |
| #geometry.apply-transform | #geometry.frac-rect | #geometry.resolve |
| #geometry.between | #geometry.in-region | #geometry.unquery |

```
#geometry.align(
  {alignment},
  {dx}: 0pt,
  {dy}: 0pt,
  {width}: 0pt,
  {height}: 0pt,
  {anchor}: auto
) → (x: relative, y: relative)
```

Compute the position of the upper left corner, taking into account the alignment and displacement.

— Argument —

(alignment) align | dictionary

Absolute alignment. If this is an `alignment`, it will be computed relative to the page. If it is a `(x: length, y: length)`, that will be used as the target position.

— Argument —

(dx): 0pt relative

Horizontal displacement.

— Argument —

(dy): 0pt relative

Vertical displacement.

— Argument —

(width): 0pt relative

Object width.

— Argument —

(height): 0pt relative

Object height.

— Argument —

(anchor): auto align | auto

Anchor point.

#geometry.apply-transform({value}, {transform}): **100%** → **any**

Apply a transformation in the form of either a scaling or a function.

Argument —

(value)

any

Value to transform. Any type as long as it supports multiplication by a scalar.

Argument —

{transform}: 100%

function | ratio

Scaling to apply, as either a ratio or a function.

#geometry.between({a}, {b}, {c}) → **bool**

Testing $a \leq b \leq c$, helps only computing b once.

Argument —

(a)

length

Lower bound.

Argument —

(b)

length

Tested value.

Argument —

(c)

length

Upper bound. Asserted to be $\geq a$.

#geometry.clamp({val}, {min}: **none**, {max}: **none**) → **any**

Bound a value between $\{min\}$ and $\{max\}$. No constraints on types as long as they support inequality testing.

Argument —

(val)

any

Base value.

Argument —

{min}: none

any | none

Lower bound.

Argument —

{max}: none

any | none

Upper bound.

#geometry.frac-rect({frac}, {abs}, ...{style}) → **block(length)**

Helper function to turn a fractional box into an absolute one.

Argument —

`{frac}`

`block(fraction)`

Child dimensions as fractions.

Argument —

`{abs}`

`block(length)`

Parent dimensions as absolute lengths.

Argument —

`..{style}`

Currently ignored.

#geometry.in-region({region}, {alignment}) → (x: length, y: length)

Resolves an anchor point relative to a region.

Argument —

`{region}`

`block`

A block (x: length, y: length, width: length, height: length).

Argument —

`{alignment}`

`align`

An alignment within the block.

#geometry.intersects({i1}, {i2}, {tolerance}: Opt)

Tests if two intervals intersect.

Argument —

`{i1}`

`(length, length)`

First interval as a tuple of (low, high) in absolute lengths.

Argument —

`{i2}`

`(length, length)`

Second interval.

Argument —

`{tolerance}: Opt`

`length`

Set to nonzero to ignore small intersections.

#geometry.resolve({size}, ..{args}) → dictionary

Converts relative and contextual lengths to absolute. The return value will contain each of the arguments once converted, with arguments that begin or end with "x"

or start with "w" being interpreted as horizontal, and arguments that begin or end with "y" or start with "h" being interpreted as vertical.

```
1 #context resolve(
2   (width: 100pt, height: 200pt),
3   x: 10%, y: 50% + 1pt,
4   width: 50%, height: 5pt,
5 )
```

Argument —

(size)

size

Size of the container as given by the layout function.

Argument —

..(args)

dictionary

Arbitrary many length arguments, automatically inferred to be horizontal or vertical.

#geometry.unquery({obj}, {regions}: (:)) → dictionary

Fetch all required answers to geometric queries. See [Section VIII.4](#) for details.

Argument —

(obj)

dictionary

Every field of this object that has an attribute (type): query will be transformed based on previously computed regions.

Argument —

(regions): (:)

dictionary(block)

Regions delimited by items already placed on the page.

IX.3 Tiling

| | | |
|-----------------------------|-----------------------|------------------------|
| #tiling.add-self-margin | #tiling.is-ignored | #tiling.placement-mode |
| #tiling.blocks-of-container | #tiling.next-elem | #tiling.push-elem |
| #tiling.blocks-of-placed | #tiling.pat-allowed | #tiling.separate |
| #tiling.create-data | #tiling.pat-forbidden | |

#tiling.add-self-margin({elem}) → elem

Applies an element's margin to itself.

Argument —

(elem)

elem

Inner element.

#tiling.blocks-of-container(({data}), (obj)) → blocks

See: #tiling.next-elem to explain (data). Computes the effective containers from an input object, as well as the display and debug outputs.

Argument —

(data)

opaque

Internal state.

Argument —

(obj)

elem

Container to segment.

▲ context

#tiling.blocks-of-placed(({data}), (obj)) → blocks

See: #tiling.next-elem to explain (data). This function computes the effective obstacles from an input object, as well as the display and debug outputs.

Argument —

(data)

opaque

Internal state.

Argument —

(obj)

elem

Object to measure, pad, and place.

#tiling.create-data(({size}): none, (elems): ()) → opaque

Initializes the initial value of the internal data for the reentering next-elem.

Argument —

(size): none

size

Dimensions of the page

Argument —

(elems): ()

(..elem,)

Elements to dispense in order

#tiling.is-ignored(({container}), (obstacle))

Eliminates non-candidates by determining if the obstacle is ignored by the container.

Argument —

(container)

Must have the field (invisible), as containers do.

— Argument —
 (obstacle)

Must have the field (tags), as obstacles do.

`#tiling.next-elem((data)) → (elem, opaque)`

This function is reentering, allowing interactive computation of the layout. Given its internal state (data), `#tiling.next-elem` uses the helper functions `#tiling.blocks-of-placed` and `#tiling.blocks-of-container` to compute the dimensions of the next element, which may be an obstacle or a container.

— Argument —
 (data)

opaque

Internal state, stores

- (size) the available page dimensions,
- (elems) the remaining elements to handle in reverse order (they will be popped),
- (obstacles) the running accumulator of previous obstacles;

`#tiling.pat-allowed((sz)) → pattern`

Pattern with green pluses to display allowed zones.

— Argument —
 (sz)

length

Size of the tiling.

`#tiling.pat-forbidden((sz)) → pattern`

Pattern with red crosses to display forbidden zones.

— Argument —
 (sz)

length

Size of the tiling.

`#tiling.placement-mode((placement)) → function`

Determines the appropriate layout invocation based on the placement mode. See details on `#meander.reflow`.

`#tiling.push-elem((data), (elem)) → opaque`

Updates the internal state to include the newly created element.

— Argument —
 (data)

opaque

Internal state.

— Argument —
 (elem)

elem

Element to register.

`#tiling.separate({seq}) → (pages: array(elem), flow: array(elem))`

Splits the input sequence into pages of elements (either obstacles or containers), and flowing content.

```
1 #separate({
2   // This is an obstacle
3   placed(top + left, box(width: 50pt, height: 50pt))
4   // This is a container
5   container(height: 50%)
6   // This is flowing content
7   content[#lorem(50)]
8 })
```

Argument —

(seq)

array(elem)

A sequence of elements made from `#placed`, `#content`, `#container`, etc.

IX.4 Bisection

| | | |
|--------------------------------------|-----------------------------------|--|
| <code>#bisect.default-rebuild</code> | <code>#bisect.has-body</code> | <code>#bisect.is-enum-item</code> |
| <code>#bisect.dispatch</code> | <code>#bisect.has-child</code> | <code>#bisect.is-list-item</code> |
| <code>#bisect.fill-box</code> | <code>#bisect.has-children</code> | <code>#bisect.split-word</code> |
| <code>#bisect.fits-inside</code> | <code>#bisect.has-text</code> | <code>#bisect.take-it-or-leave-it</code> |

`#bisect.default-rebuild({inner-field})[ct] → (dictionnary, function)`

Destructure and rebuild content, separating the outer content builder from the rest to allow substituting the inner contents. In practice what we will usually do is recursively split the inner contents and rebuild the left and right halves separately.

Inspired by [WRAP-IT's implementation](#) (see: `#_rewrap` in [github:ntjess/wrap-it](#))

```
1 #let content = box(stroke: red)[Initial]
2 #let (inner, rebuild) = default-rebuild(
3   content, "body",
4 )
5
6 Content: #content \
7 Inner: #inner \
8 Rebuild: #rebuild("foo")

1 #let content = [*_Initial_*]
```

```

2 #let (inner, rebuild) = default-rebuild(
3   content, "body",
4 )
5
6 Content: #content \
7 Inner: #inner \
8 Rebuild: #rebuild("foo")

1 #let content = [a:b]
2 #let (inner, rebuild) = default-rebuild(
3   content, "children",
4 )
5
6 Content: #content \
7 Inner: #inner \
8 Rebuild: #rebuild(([x], [y]))

```

— Argument —

(inner-field)

str

What “inner” field to fetch (e.g. "body", "text", "children", etc.)

#bisect.dispatch({fits-inside}, {cfg})[ct] → (content?, content?)

Based on the fields on the content, call the appropriate splitting function. This function is involved in a mutual recursion loop, which is why all other splitting functions take this one as a parameter.

— Argument —

(ct)

content

Content to split.

— Argument —

(fits-inside)

function

Closure to determine if the content fits (see `#bisect.fits-inside`).

— Argument —

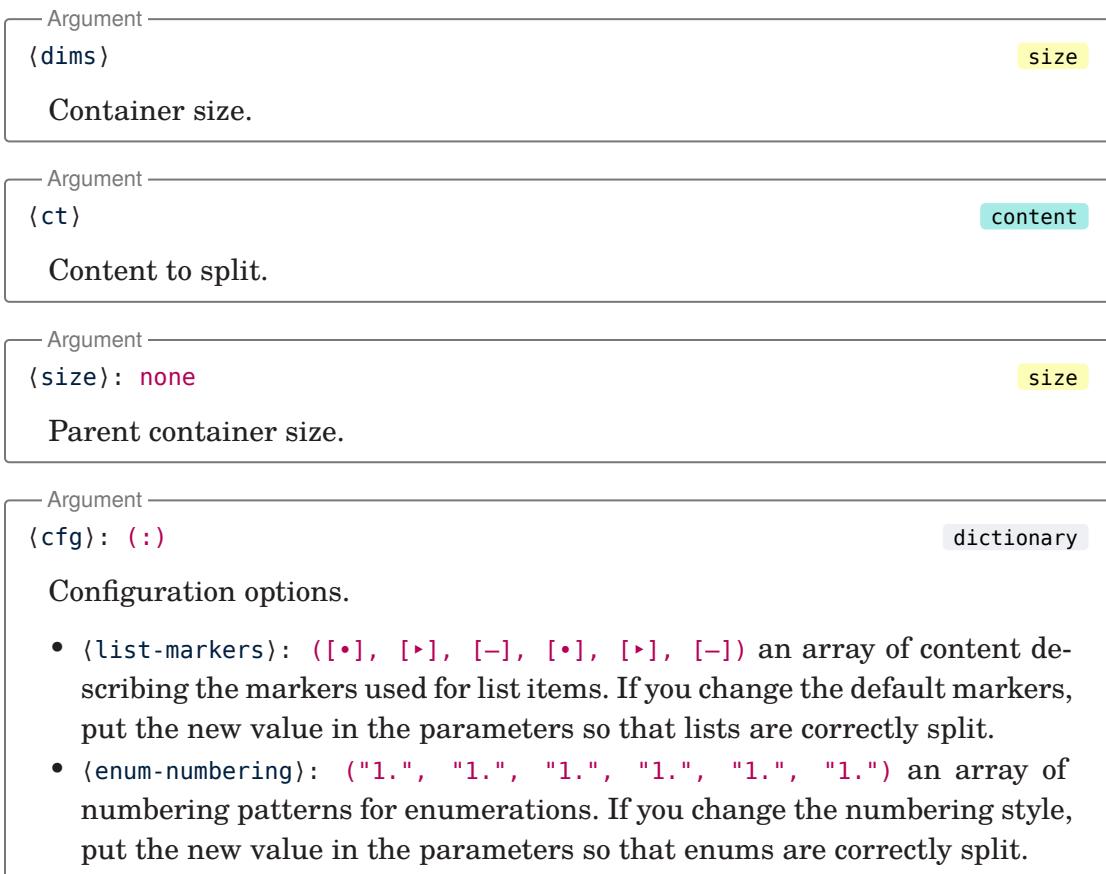
{cfg}

dictionary

Extra configuration options.

#bisect.fill-box({dims}, {size}: none, {cfg}: (:))[ct] → (content, content)

Initialize default configuration options and take as much content as fits in a box of given size. Returns a tuple of the content that fits and the content that overflows separated.

**↖ context****#bisection.fits-inside(dims, size): none)[ct] → bool**

Tests if content fits inside a box.

Horizontal fit is not very strictly checked. A single word may be said to fit in a box that is less wide than the word. This is an inherent limitation of `measure(box(...))` and I will try to develop workarounds for future versions.

The closure of this function constitutes the basis of the entire content splitting algorithm: iteratively add content until it no longer fits inside the box, with what “iteratively add content” means being defined by the content structure. Essentially all remaining functions in this file are about defining content that can be split and the correct way to invoke `#bisection.fits-inside` on them.

```

1  #let dims = (width: 100%, height: 50%)
2  #box(width: 7cm, height: 3cm)[#layout(size => context {
3    let words = [#lorem(12)]
4    [#fits-inside(dims, words, size: size)]
5    linebreak()
6    box(..dims, stroke: 0.1pt, words)
7  })]

```

```

1 #let dims = (width: 100%, height: 50%)
2 #box(width: 7cm, height: 3cm)[#layout(size => context {
3   let words = [#lorem(15)]
4   [#fits-inside(dims, words, size: size)]
5   linebreak()
6   box(..dims, stroke: 0.1pt, words)
7 })]

```

— Argument —

(dims)

(width: relative, height: relative)

Maximum container dimensions. Relative lengths are allowed.

— Argument —

(ct)

content

Content to fit in.

— Argument —

(size): none

(width: length, height: length)

Dimensions of the parent container to resolve relative sizes. These must be absolute sizes.

#bisect.has-body((split-dispatch), (fits-inside), (cfg))[ct] →
(content?, content?)

Split content with a "body" main field. There is a special strategy for list.item and enum.item which are handled separately. Elements #strong, #emph, #underline, #stroke, #overline, #highlight, #par, #align, #link are splittable, the rest are treated as non-splittable.

— Argument —

(ct)

content

Content to split.

— Argument —

(split-dispatch)

function

Recursively passed around (see **#bisect.dispatch**).

— Argument —

(fits-inside)

function

Closure to determine if the content fits (see **#bisect.fits-inside**).

— Argument —

(cfg)

dictionary

Extra configuration options.

```
#bisect.has-child({split-dispatch}, {fits-inside}, {cfg})[ct] →
(content?, content?)
```

Split content with a "child" main field.

Strategy: recursively split the child.

Argument —

(ct)

content

Content to split.

Argument —

(split-dispatch)

function

Recursively passed around (see #bisect.dispatch).

Argument —

(fits-inside)

function

Closure to determine if the content fits (see #bisect.fits-inside).

Argument —

(cfg)

dictionary

Extra configuration options.

```
#bisect.has-children({split-dispatch}, {fits-inside}, {cfg})[ct] →
(content?, content?)
```

Split content with a "children" main field.

Strategy: take all children that fit.

Argument —

(ct)

content

Content to split.

Argument —

(split-dispatch)

function

Recursively passed around (see #bisect.dispatch).

Argument —

(fits-inside)

function

Closure to determine if the content fits (see #bisect.fits-inside).

Argument —

(cfg)

dictionary

Extra configuration options.

```
#bisect.has-text(({split-dispatch}, {fits-inside}, {cfg}))[ct] →
(content?, content?)
```

Split content with a "text" main field.

Strategy: split by " " and take all words that fit. Then if hyphenation is enabled, split by syllables and take all syllables that fit. End the block with a #linebreak that has the justification of the paragraph.

Argument –
 (ct) content
 Content to split.

Argument –
 (split-dispatch) function
 Recursively passed around (see #bisect.dispatch).

Argument –
 (fits-inside) function
 Closure to determine if the content fits (see #bisect.fits-inside).

Argument –
 (cfg) dictionary
 Extra configuration options.

```
#bisect.is-enum-item(({split-dispatch}, {fits-inside}, {cfg}))[ct] →
(content?, content?)
```

Split an enum.item.

The numbering will reset on the split. I am developing a fix, in the meantime use explicit numbering.

Strategy: recursively split the body, and do some magic to simulate a numbering indent.

Argument –
 (ct) content
 Content to split.

Argument –
 (split-dispatch) function
 Recursively passed around (see #bisect.dispatch).

| | |
|---|---|
| <p>— Argument —</p> <p><code>(fits-inside)</code></p> | <p>function</p> <p>Closure to determine if the content fits (see <code>#bisect.fits-inside</code>).</p> |
| <p>— Argument —</p> <p><code>(cfg)</code></p> | <p>dictionary</p> <p>Extra configuration options.</p> |
| | |
| <pre><code>#bisect.is-list-item(({split-dispatch}, {fits-inside}, {cfg})[ct] → (content?, content?))</code></pre> | |
| <p>Split a list.item.</p> <p>Strategy: recursively split the body, and do some magic to simulate a bullet point indent.</p> | |
| <p>— Argument —</p> <p><code>(ct)</code></p> | <p>content</p> <p>Content to split.</p> |
| | |
| <p>— Argument —</p> <p><code>(split-dispatch)</code></p> | <p>function</p> <p>Recursively passed around (see <code>#bisect.dispatch</code>).</p> |
| | |
| <p>— Argument —</p> <p><code>(fits-inside)</code></p> | <p>function</p> <p>Closure to determine if the content fits (see <code>#bisect.fits-inside</code>).</p> |
| | |
| <p>— Argument —</p> <p><code>(cfg)</code></p> | <p>dictionary</p> <p>Extra configuration options.</p> |
| | |
| <pre><code>#bisect.split-word(({ww}, {fits-inside}, {cfg}) → (content?, content?))</code></pre> | |
| <p>Split one word according to hyphenation patterns, if enabled.</p> | |
| <p>— Argument —</p> <p><code>{ww}</code></p> | <p>str</p> <p>Word to split.</p> |
| | |
| <p>— Argument —</p> <p><code>(fits-inside)</code></p> | <p>function</p> <p>Closure to determine if the content fits (see <code>#bisect.fits-inside</code>).</p> |
| | |
| <p>— Argument —</p> <p><code>(cfg)</code></p> | <p>dictionary</p> |

Extra configuration options.

`#bisect.take-it-or-leave-it({fits-inside})[ct] → (content?, content?)`

“Split” opaque content.

Argument —

`(ct)`

`content`

This content cannot be split. If it fits take it, otherwise keep it for later.

Argument —

`(fits-inside)`

`function`

Closure to determine if the content fits (see `#bisect.fits-inside`).

IX.5 Threading

`#threading.smart-fill-boxes`

↳ context

`#threading.smart-fill-boxes({avoid}: (), {boxes}: (), {size}: none)[body] → (full: , overflow: overflow)`

Thread text through a list of boxes in order, allowing the boxes to stretch vertically to accomodate for uneven tiling.

Argument —

`(body)`

`content`

Flowing text.

Argument —

`(avoid): ()`

`(..block,)`

An array of `block` to avoid.

Argument —

`(boxes): ()`

`(..block,)`

An array of `block` to fill.

The `(bound)` parameter of `block` is used to know how much the container is allowed to stretch.

Argument —

`(size): none`

`size`

Dimensions of the container as given by `#layout`.

Part X

Modularity (WIP)

Because meander is cleanly split into three algorithms (content bisection, page tiling, text threading), there are plans to provide

- additional configuration options for each of those steps
- the ability to replace entirely an algorithm by either a variant, or a user-provided alternative that follows the same signature.

Part XI

About

XI.1 Related works

This package takes a lot of basic ideas from [Typst's own builtin layout model](#), mainly lifting the restriction that all containers must be of the same width, but otherwise keeping the container-oriented workflow. There are other tools that implement similar features, often with very different models internally.

In Typst:

- [WRAP-IT](#) has essentially the same output as [MEANDER](#) with only one obstacle and one container. It is noticeably more concise for very simple cases.

In L^AT_EX:

- [wrapfig](#) can achieve similar results as [MEANDER](#) as long as the images are rectangular, with the notable difference that it can even affect content outside of the `\begin{wrapfigure}... \end{wrapfigure}` environment.
- [floatfit](#) and [picins](#) can do a similar job as [wrapfig](#) with slightly different defaults.
- [parshape](#) is more low-level than all of the above, requiring every line length to be specified one at a time. It has the known drawback to attach to the paragraph data that depends on the obstacle, and is therefore very sensitive to layout adjustments.

Others:

- [Adobe InDesign](#) supports threading text and wrapping around images with arbitrary shapes.

XI.2 Dependencies

In order to obtain hyphenation patterns, [MEANDER](#) imports [HY-DRO-GEN](#), which is a wrapper around [typst/hyper](#). This manual is built using [MANTYS](#) and [TIDY](#).

XI.3 Acknowledgements

[MEANDER](#) would have taken much more effort had I not had access to [WRAP-IT](#)'s source code to understand the internal representation of content, so thanks to [@ntjess](#).

[MEANDER](#) started out as an idea in the Typst Discord server; thanks to everyone who gave input and encouragements.