

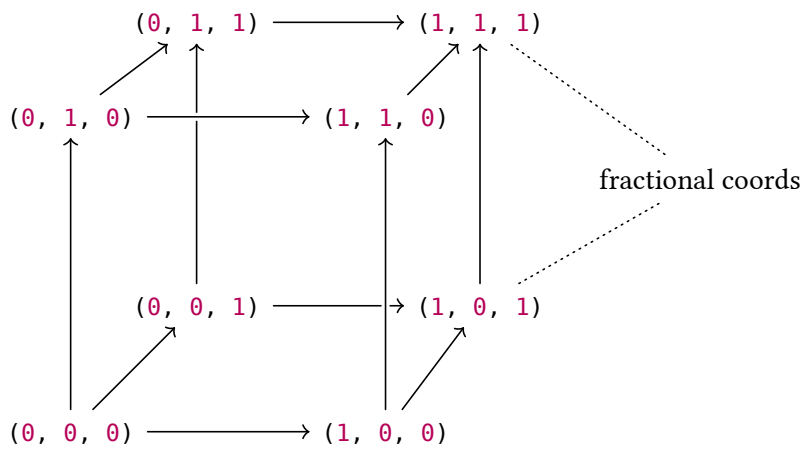
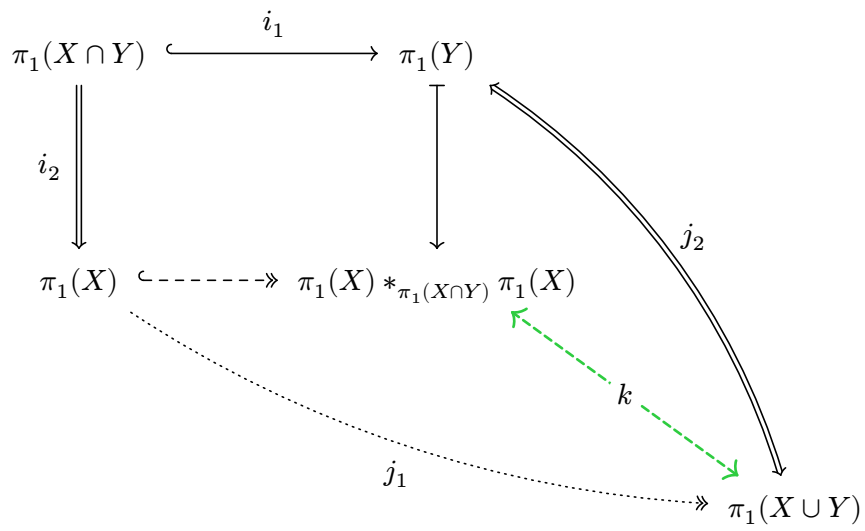
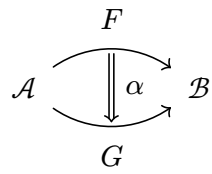
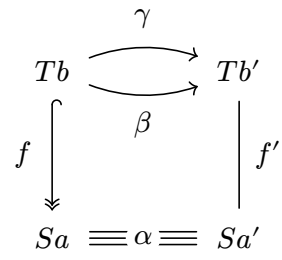
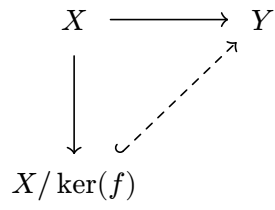
# arrow-diagrams

A Typst package for drawing diagrams with arrows.

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## Examples



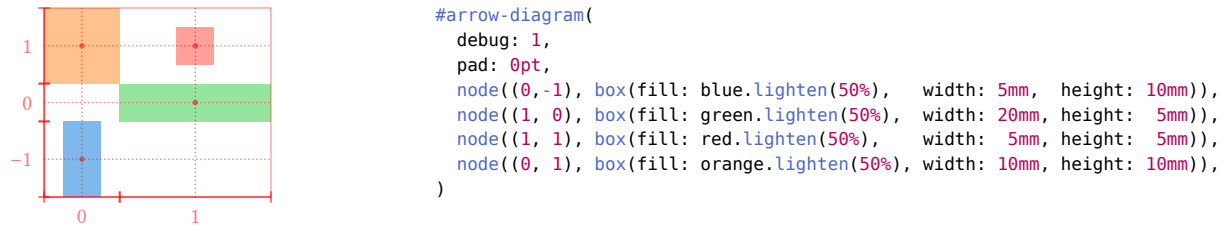
## **Tutorial**

# Layout

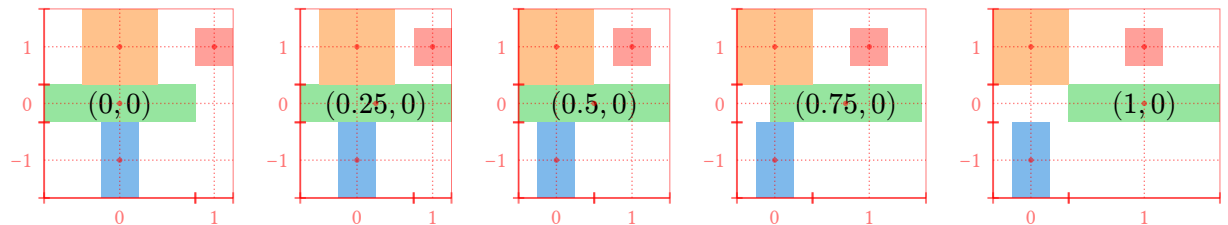
## How the layouting works

Each diagram is built on a grid of points, each at the center of a cell in a table layout. When a node is placed in a diagram, the rows and columns grow to accommodate the node's size.

This can be seen more clearly in diagrams with `debug: 1` and no cell padding:



While grid points are always at integer coordinates, nodes can also have **fractional coordinates**. A node between grid points still causes the neighbouring rows and columns to grow to accommodate its size, but only partially, depending on proximity. For example, notice how the column sizes change as the green box moves from (0, 0) to (1, 0):

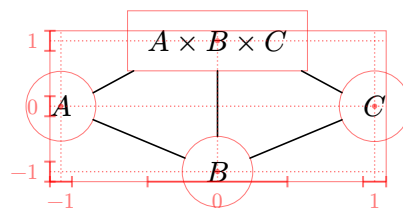


Specifically, fractional coordinates are dealt with by *linearly interpolating* the layout, in the sense that if a node is at (0.25, 0), then the width of column  $[0.25] = 0$  is at least 75% of the node's width, and column  $[0.25] = 1$  at least 25% its width.

As a result, diagrams will automatically adjust when nodes grow or shrink, while still allowing you to place nodes at precise coordinates.

## How connecting lines work

Lines between nodes connect to the node's bounding circle or bounding rectangle, depending on the node's aspect ratio.



## The defocus correction

For aesthetic reasons, a line connecting to a node should not necessarily be focused to the node's exact center, especially if the node is short and wide or tall and narrow. Notice how in the figure above the lines connecting to the node  $A \times B \times C$  would intersect slightly above its center, making the diagram look more comfortable. The effect of this is shown below:

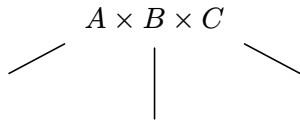


Figure 1: With defocus correction

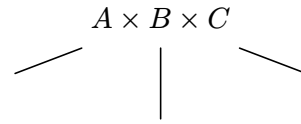
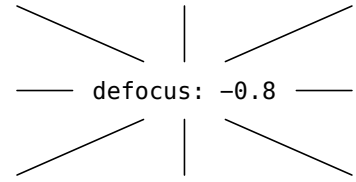
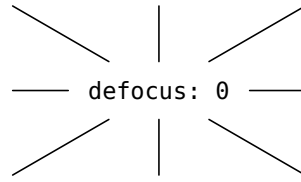
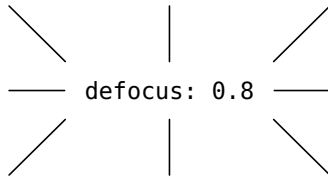


Figure 2: Without defocus correction

This correction is controlled by the `defocus` attribute of the node. It is best explained by example:



For `defocus: 0`, the connecting lines are directed exactly at the grid point at the node's center.

## Function reference

### arrow-diagram

Draw an arrow diagram

#### Parameters

```
arrow-diagram(  
  ..args: array ,  
  pad: length pair of lengths ,  
  debug: bool 1 2 3 ,  
  node-outset: length pair of lengths ,  
  defocus: number ,  
  min-size: length pair of lengths  
)
```

**..args** array

An array of dictionaries specifying the diagram's nodes and connections.

**pad** length or pair of lengths

Minimum gap between the bounding boxes of nodes.

Default: **3em**

**debug** bool or 1 or 2 or 3

Level of detail for drawing debug information.

Default: **false**

**node-outset** length or pair of lengths

Inset between a node's content and its bounding box.

Default: **15pt**

**defocus** number

Strength of the defocus correction. 0 to disable.

Default: **0.2**

**min-size** length or pair of lengths

Minimum size of all rows and columns.

Default: **0pt**

## resolve-coords

Resolve coordinates and pass them to a callback function

### Parameters

```
resolve-coords(  
  ..args: point2f,  
  callback: function  
)
```

**..args** point2f

One or more dimensionless 2D points of the form (x, y).

**callback** function

Function to be called with the resolved coordinates as arguments.

Default: (..args) => none

## compute-cells

Compute a lookup table of the attributes of each grid cell

### Parameters

```
compute-cells(  
  nodes: array,  
  grid: dictionary,  
  options  
)
```

**nodes** array

Array of nodes to consider when calculating the sizes of cells, where each node of the form:

```
(  
  pos: (i, j),  
  size: (width, height),  
)
```

**grid** dictionary

Grid specification of the form

```
(  
  origin: (i, j),  
  centers: ((x1, x2, ...), (y1, y2, ...)),  
)
```

**options**

## compute-grid

Determine the number, sizes and positions of rows and columns.

### Parameters

```
compute-grid(  
    nodes,  
    options  
)
```

**nodes**

**options**

## expand-fractional-rects

Convert an array of rects with fractional positions into rects with integral positions.

A rect is a dictionary .

If a rect is centered at a fractional position  $\text{floor}(x) < x < \text{ceil}(x)$ , it will be replaced by two new rects centered at  $\text{floor}(x)$  and  $\text{ceil}(x)$ . The total width of the original rect is split across the two new rects according to which one is closer. (E.g., if the original rect is at  $x = 0.25$ , the new rect at  $x = 0$  has 75% the original width and the rect at  $x = 1$  has 25%.) The same splitting procedure is done for y positions and heights.

### Parameters

```
expand-fractional-rects(rects: array of rects) -> array of rects
```

**rects**    array of rects

An array of rectangles of the form (pos: (x, y), size: (width, height)). The coordinates x and y may be floats.

## round-arrow-cap-offset

Calculate cap offset of round-style arrow cap

### Parameters

```
round-arrow-cap-offset(  
    r: length,  
    θ: angle,  
    y: length  
)
```

**r**    length

Radius of curvature of arrow cap.



**θ** `angle`

Angle made at the the arrow's vertex, from the central stroke line to the arrow's edge.

**y** `length`

Lateral offset from the central stroke line.

### **get-arc-connecting-points**

Determine arc between two points with a given bend angle

The bend angle is the angle between chord of the arc (line connecting the points) and the tangent to the arc and the first point.

#### **Parameters**

```
get-arc-connecting-points(  
  from: point,  
  to: point,  
  angle: angle  
)
```

**from** `point`

2D vector of initial point.

**to** `point`

2D vector of final point.

**angle** `angle`

The bend angle between chord of the arc (line connecting the points) and the tangent to the arc and the first point.

