

# Luatodnotes: Boundary Labeling for Annotations in Texts

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label

Text for the  
first  
annotation

Text for  
second  
annotation

Text for  
third  
annotation

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Text for second annotation

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leader

## Goals

- Easy for the reader to match notes and sites in text
- No crossings between leaders
- Leaders should not disturb text too much

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Problem known as *boundary labeling*:

- Shape of the leaders
- Positions for the labels
- Labels are non-uniform!

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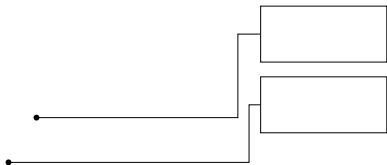
Text for the first annotation

Text for third annotation

Text for second annotation

## Leader Types

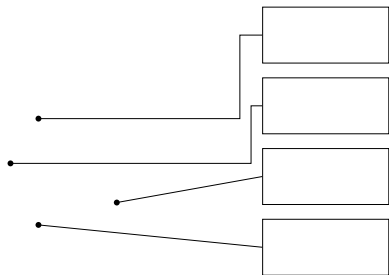
- *opo*-leaders





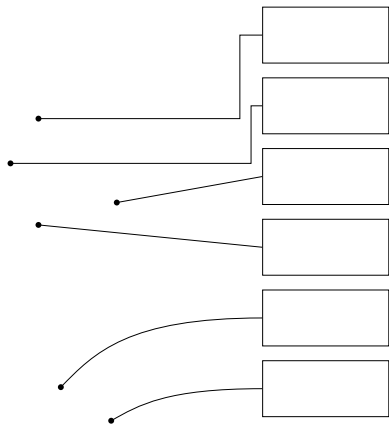
## Leader Types

- *opo*-leaders
- *s*-leaders



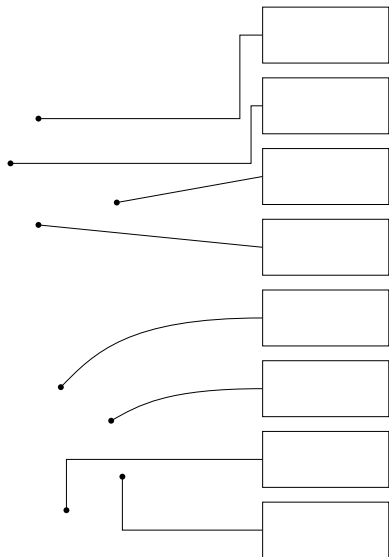
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- *s*-leaders
- Bézier curves  
(based on *s*-leaders)

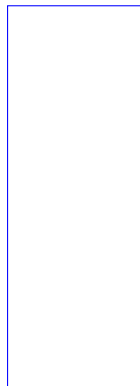


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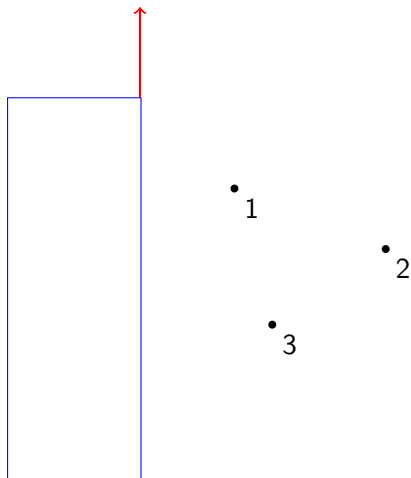


## s-leaders



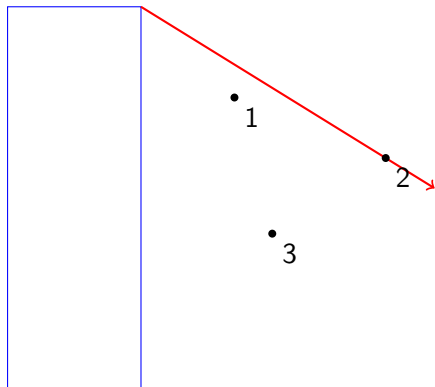
- Use upper right corner as anchor
- No gaps between labels
- No crossings between leaders
- Algorithm: Emit ray from next anchor to the top and rotate it clockwise  
[Bekos, Kaufmann, Symvonis, Wolff, 2007]

## s-leaders



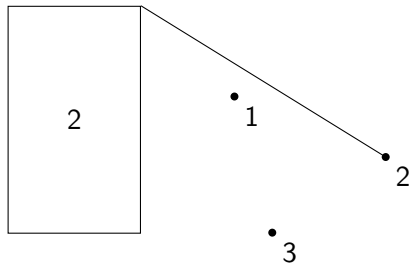
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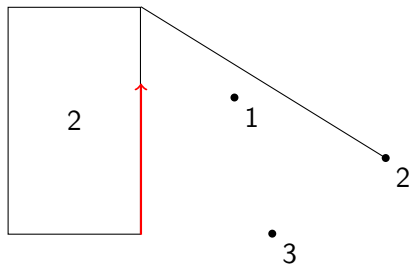
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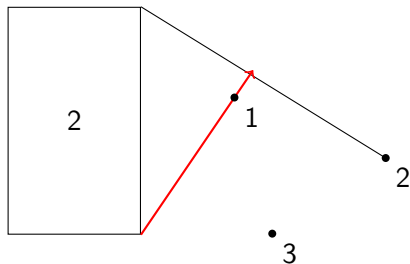
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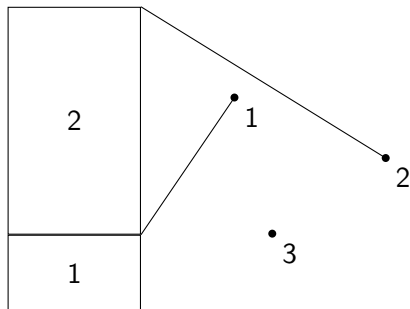


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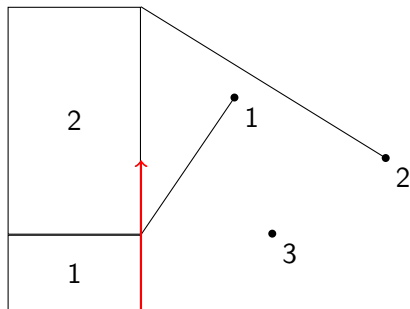
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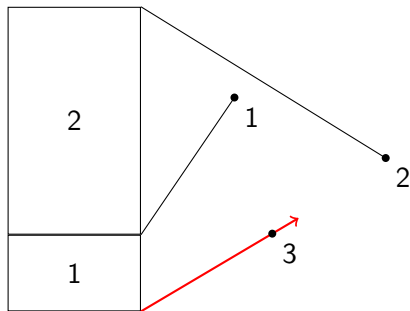
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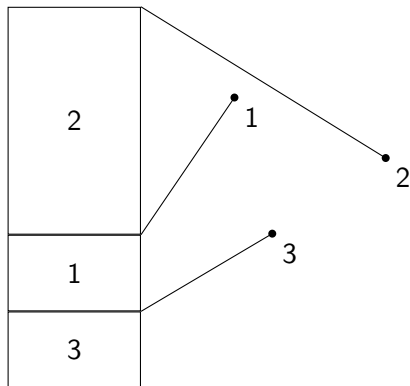
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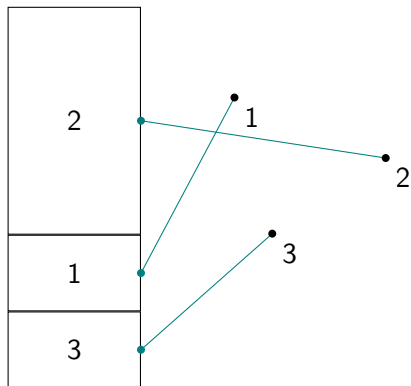
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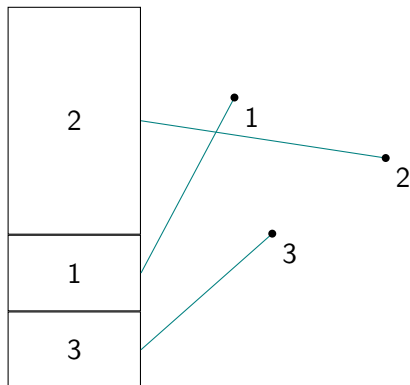
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## s-leaders

- Alternative: Anchor leader at center of label

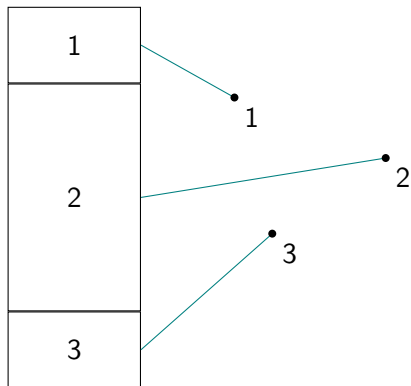


## s-leaders



- Alternative: Anchor leader at center of label
- Here: Need to swap labels 2 and 1

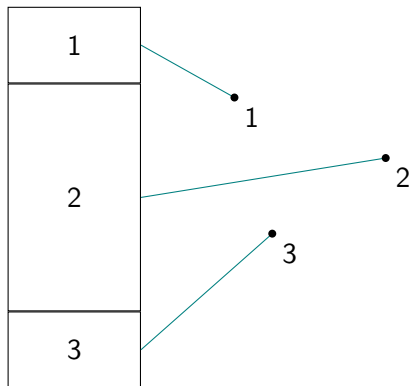
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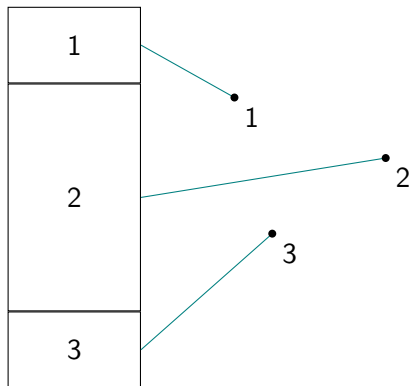
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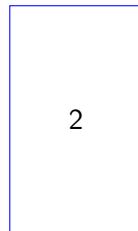
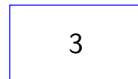
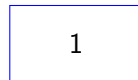
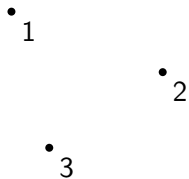
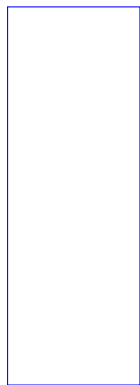


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- Easy with uniform labels

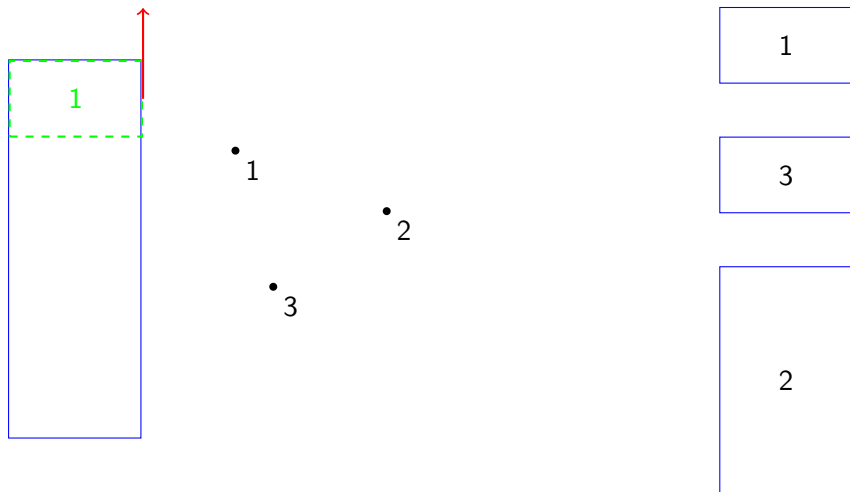


- Alternative: Anchor leader at center of label
- Here: Need to swap labels 2 and 1
- Easy with uniform labels
- For non-uniform labels: no algorithm known to compute order of labels for given site positions and label heights (no gaps, no crossings allowed)
- Problem: we don't know position of next anchor (depends on label height)

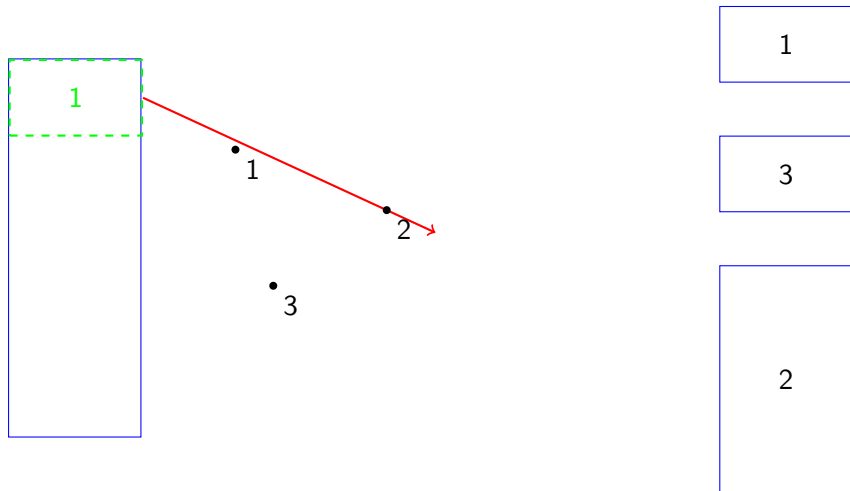
# Heuristic for s-leaders



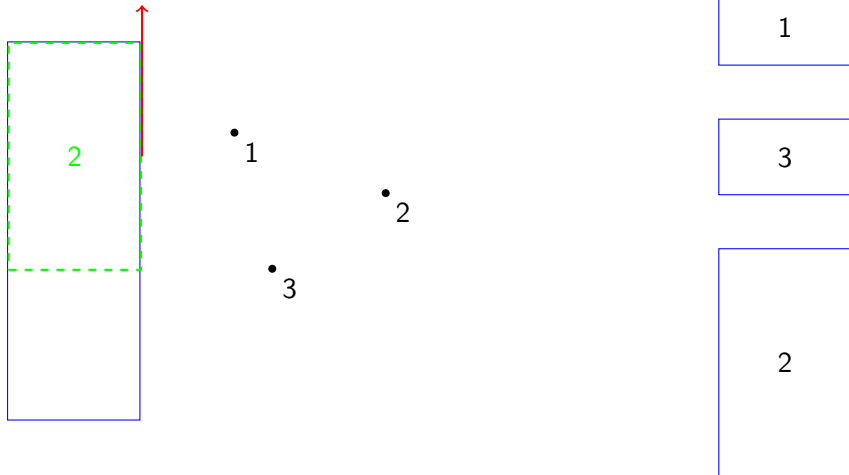
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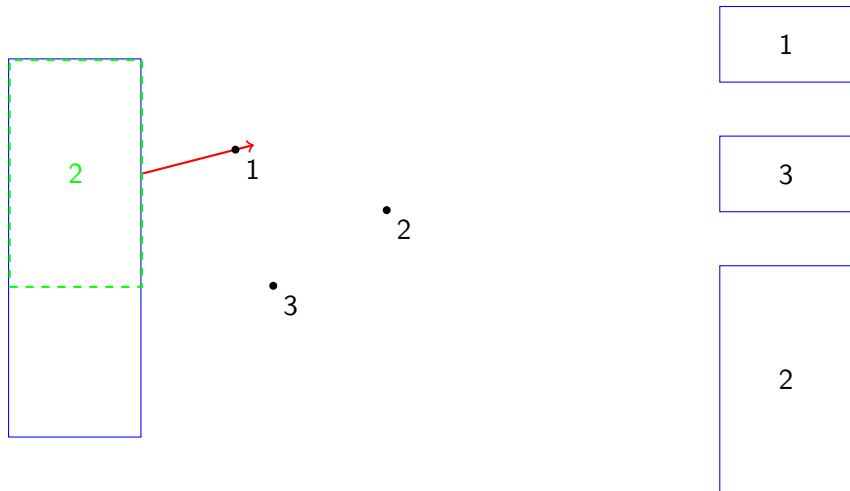
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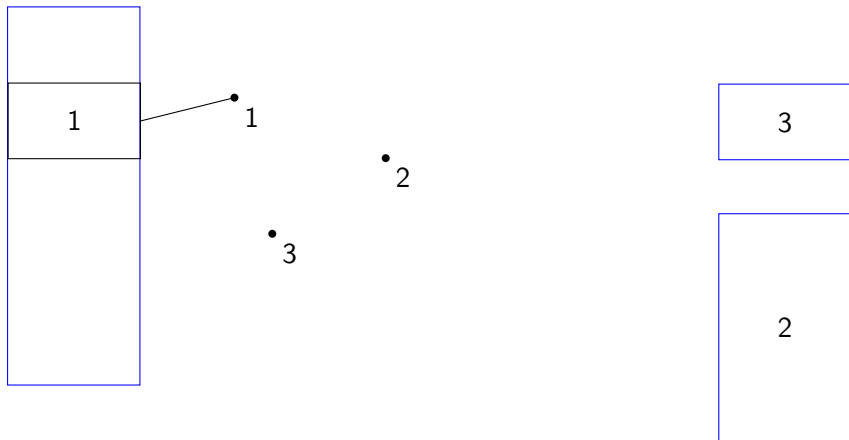
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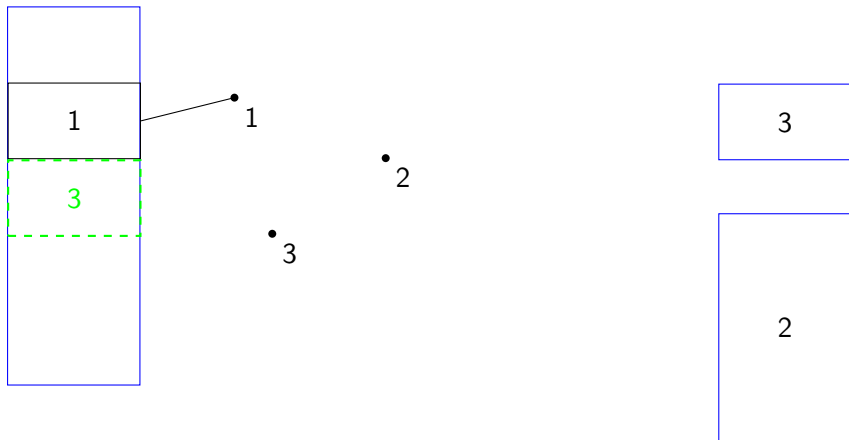


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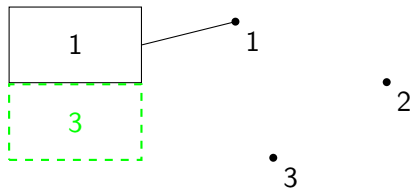




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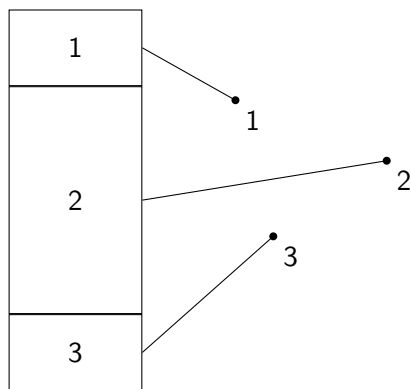
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## Characteristics

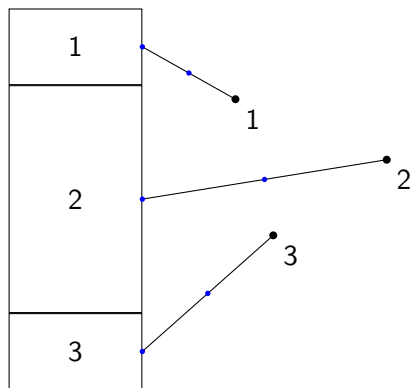
- No crossings between leaders
- Gaps between labels are possible
- Usually no gaps in real instances

# Bézier curves as leaders



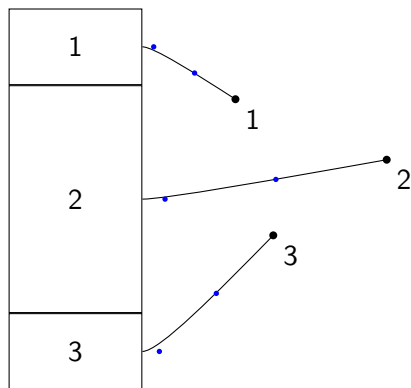
- Force-directed algorithm [Fink, Haunert, Schulz, Spoerhase, Wolff, 2012]
- Start with crossing-free straight-line drawing
- Cubic Bézier curves
- Move control points by applying forces
- Forces limited to inhibit new crossings

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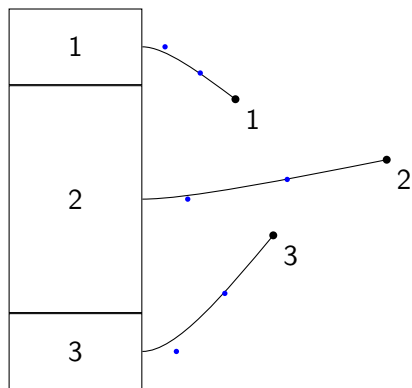
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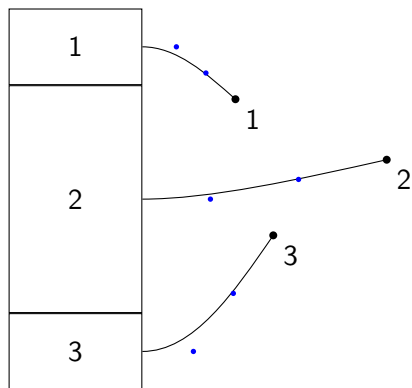
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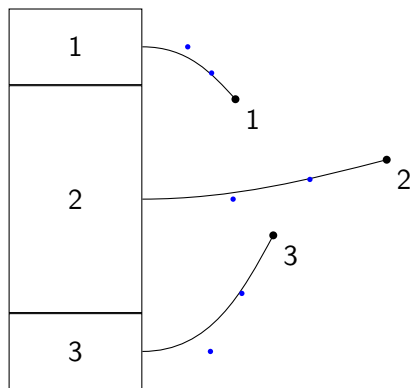
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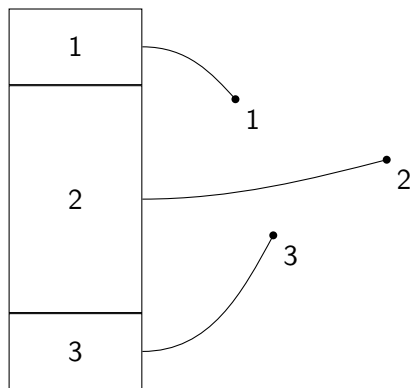
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# Experimental Results

- Implementation as a  $\text{\LaTeX}$  package
- Different leader types can be chosen

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First comment

The second comment is a bit longer.

More comments

short

This comment is much longer. It needs more lines of text than the previous ones.

This is the last comment in this paragraph. The next two paragraphs do not contain any comments.

Comment in another paragraph

Second comment in same line

Third one

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First comment

The second comment is a bit longer

More comments.

short

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Third one

Second comment in same line

Comment in another paragraph

# Experimental Results

- Implementation as a L<sup>A</sup>T<sub>E</sub>X package
- Different leader types can be chosen

## Leader types

- opo*-leaders
- s-leaders
- Bézier leaders

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- Using modern  $\text{T}_{\text{E}}\text{X}$  processor  $\text{LuaT}_{\text{E}}\text{X}$ :
  - can use high-level programming language Lua inside our  $\text{\LaTeX}$  package
  - Included in every modern  $\text{T}_{\text{E}}\text{X}$  distribution
- Easily extensible

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## How to use?

- Install package `luatodonotes` (available on CTAN)
- Load package:

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\usepackage{luatodonotes}
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**Thank you!**



# APPENDIX

- LibreOffice
- todonotes package
- opo-leaders
- s-leaders
- Bézier leaders

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User Heute, 17:34

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User Heute, 17:35

More comments.

User Heute, 17:38

short

User Heute, 17:39

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