Luatodonotes: Boundary Labeling for Annotations in Texts

Philipp Kindermann **Fabian Lipp** Alexander Wolff

Julius-Maximilians-Universität Würzburg

September 24, Graph Drawing 2014

The following text is taken from the `blindtext` package for LaTeX.

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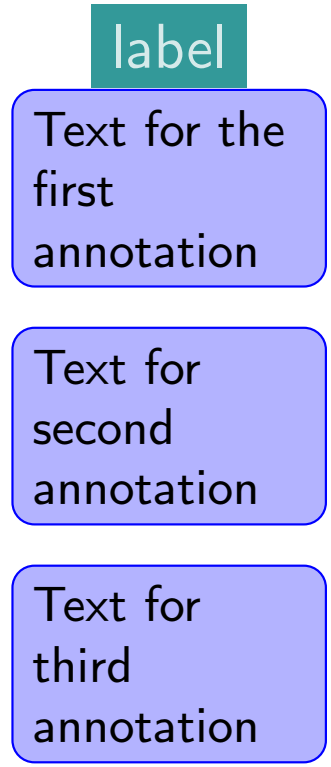
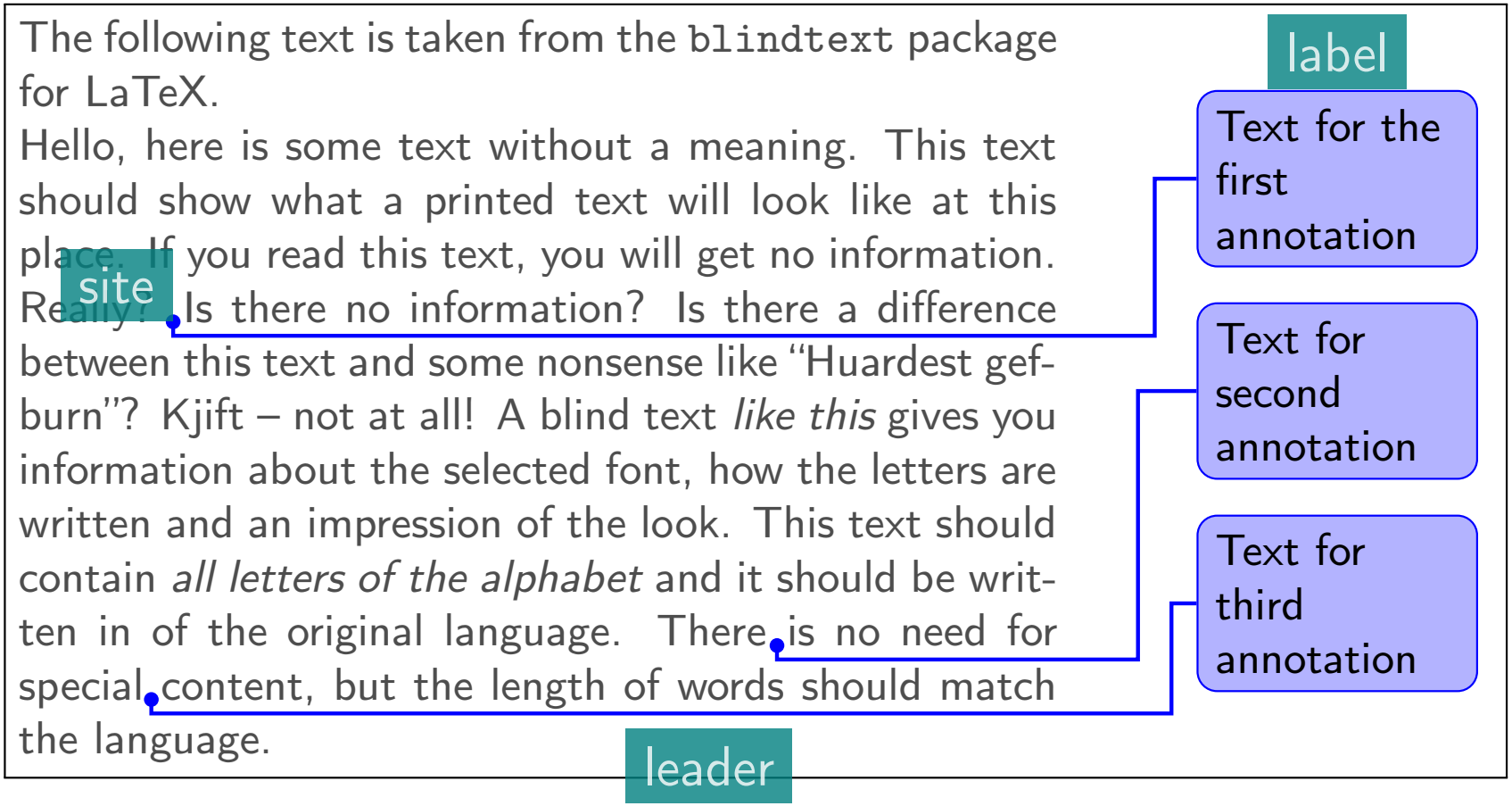
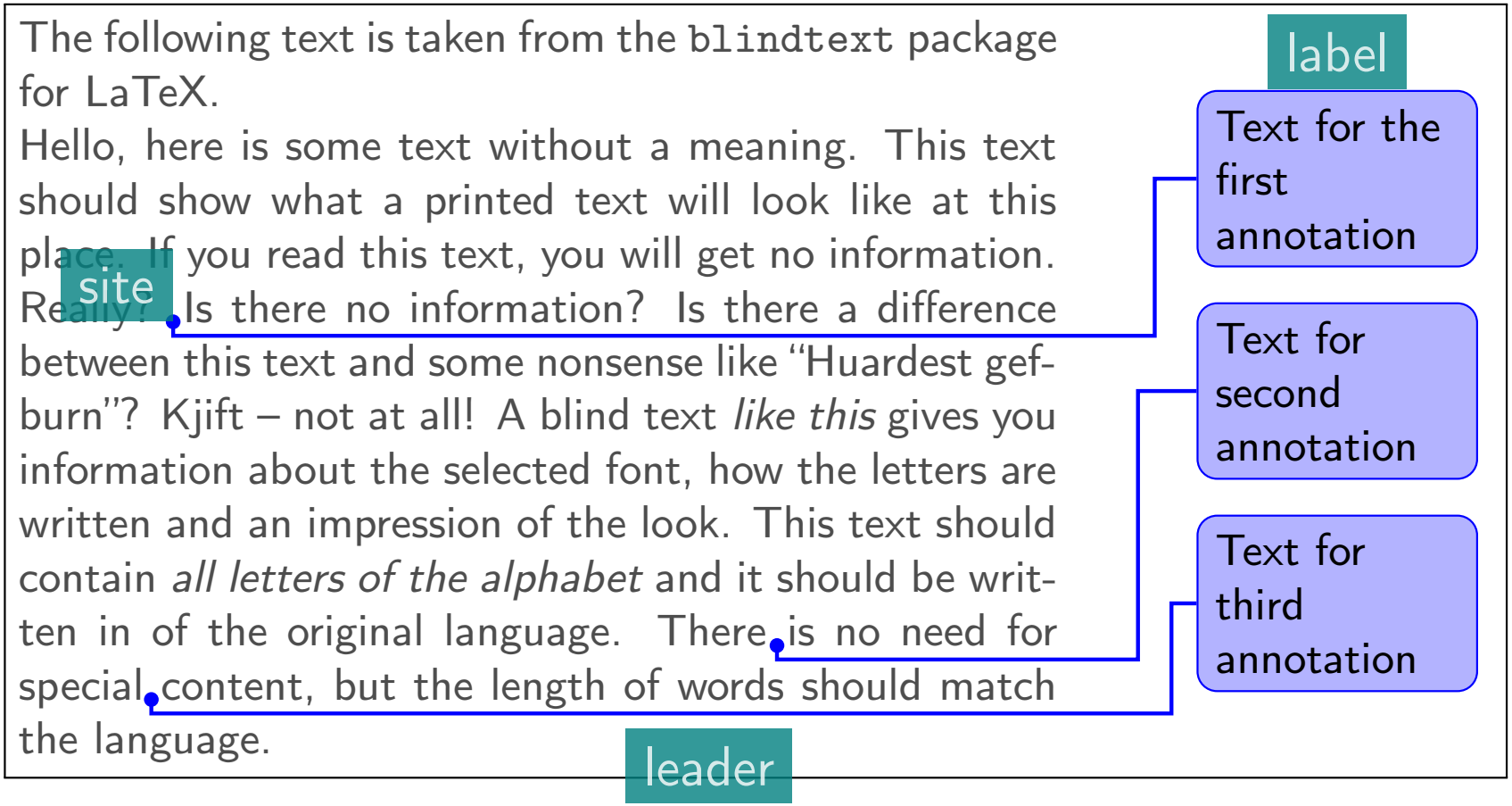




Goals

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



Problem known as *boundary labeling*:

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

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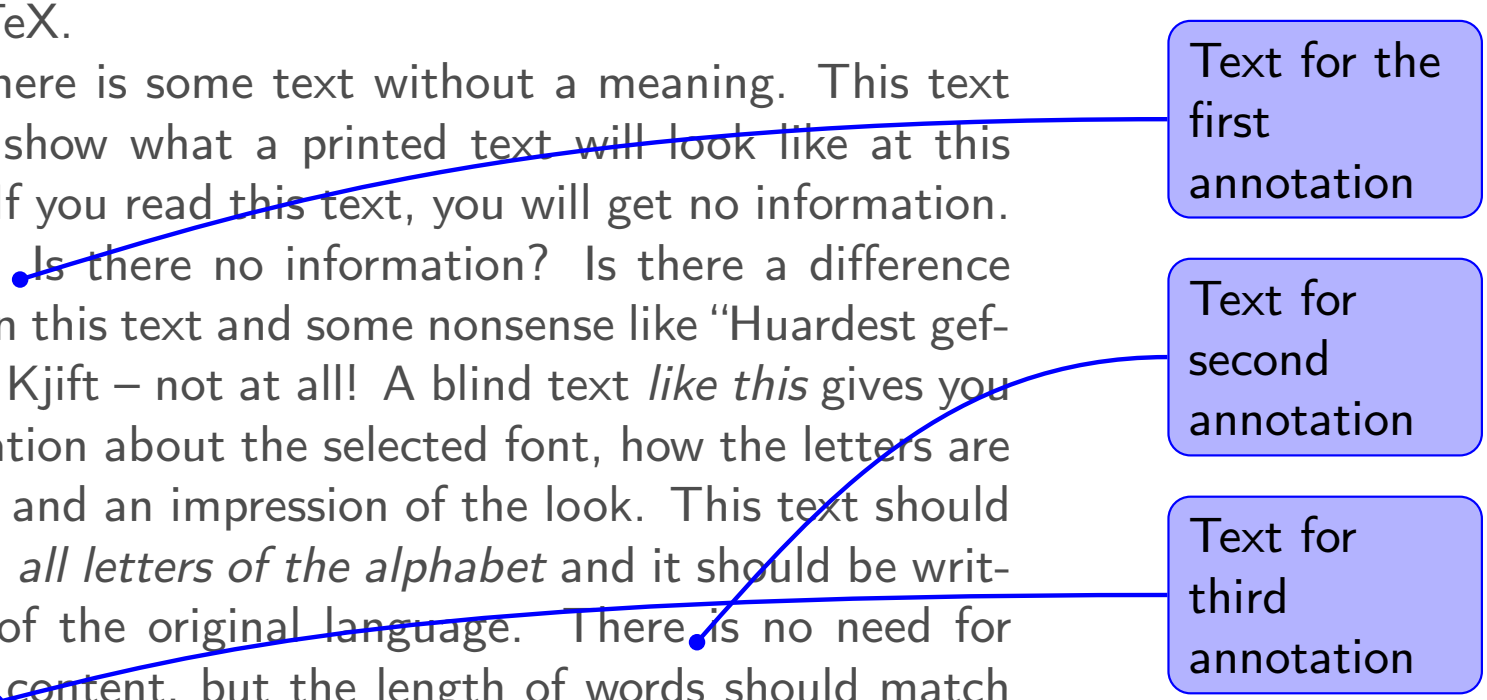

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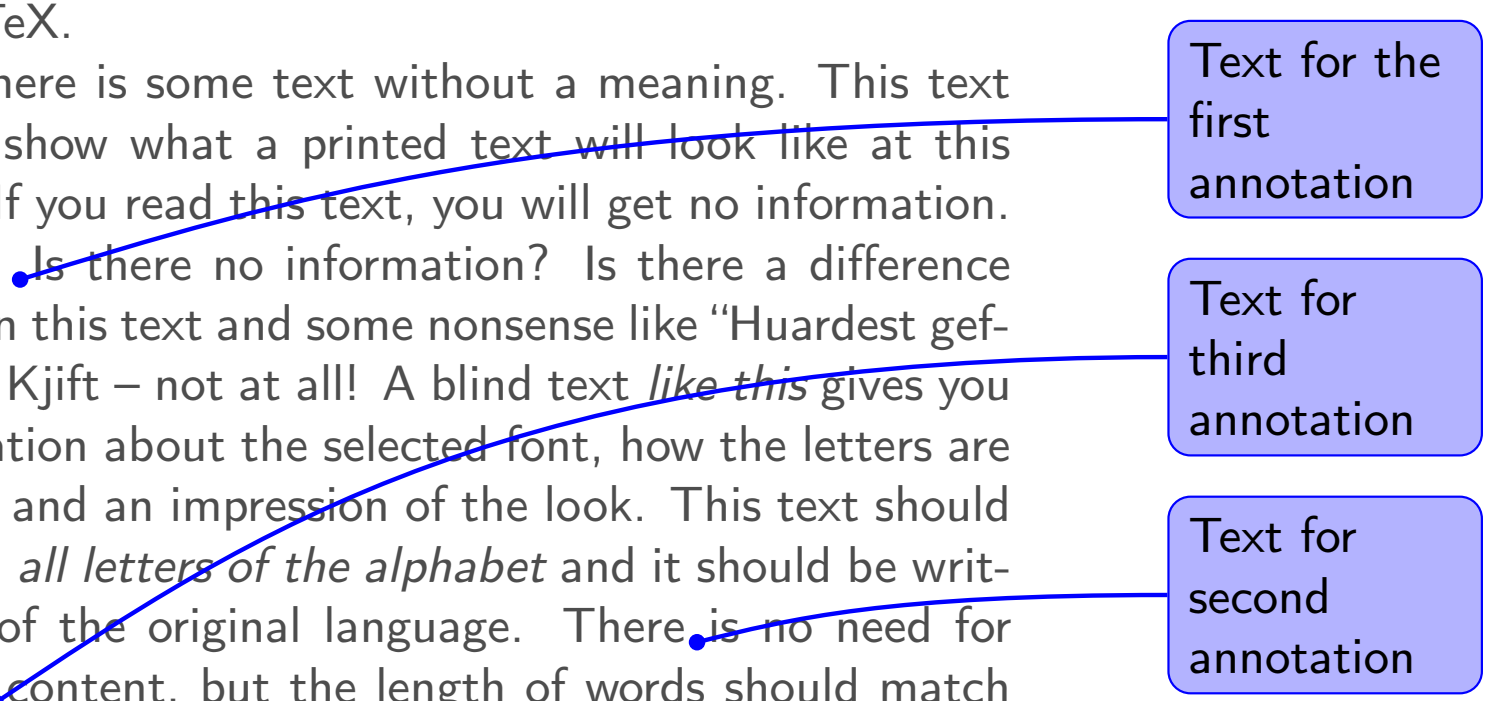
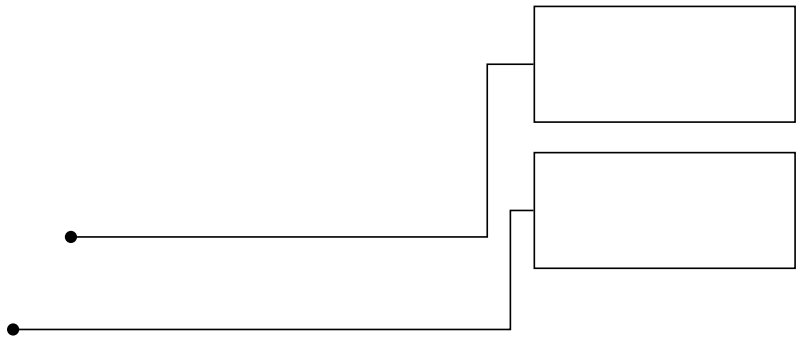


Algorithms



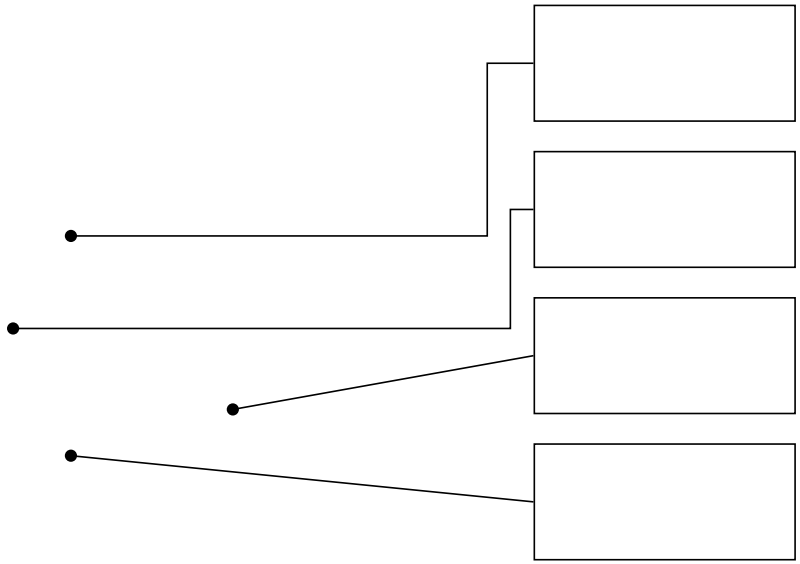
Leader Types

- *opo*-leaders

Algorithms

Leader Types

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



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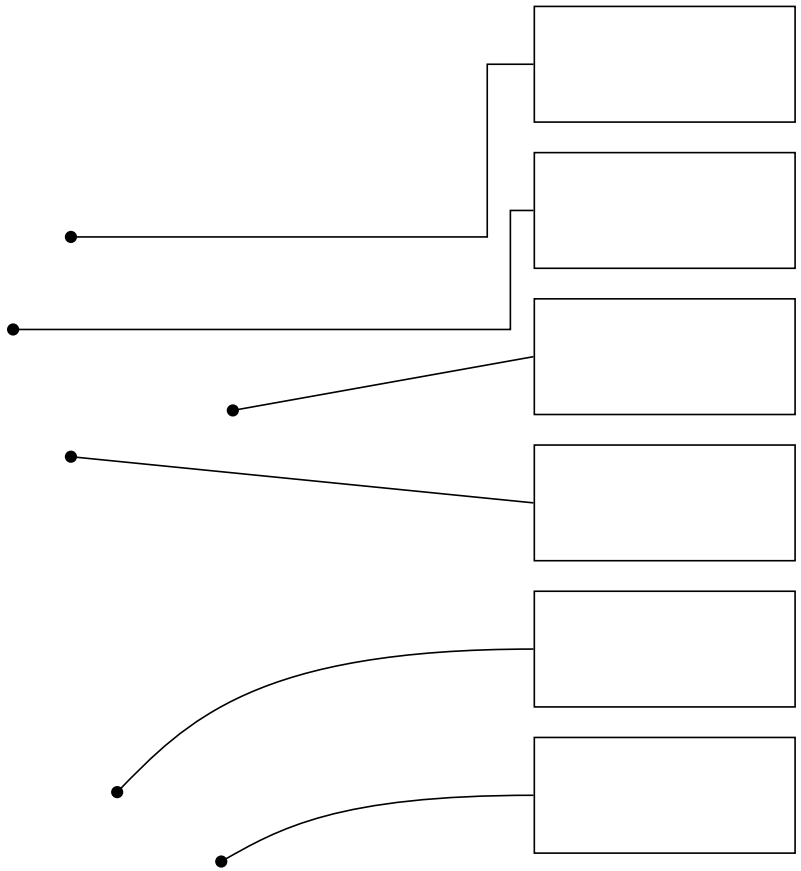
- *s*-leaders
- Bézier curves (based on *s*-leaders)



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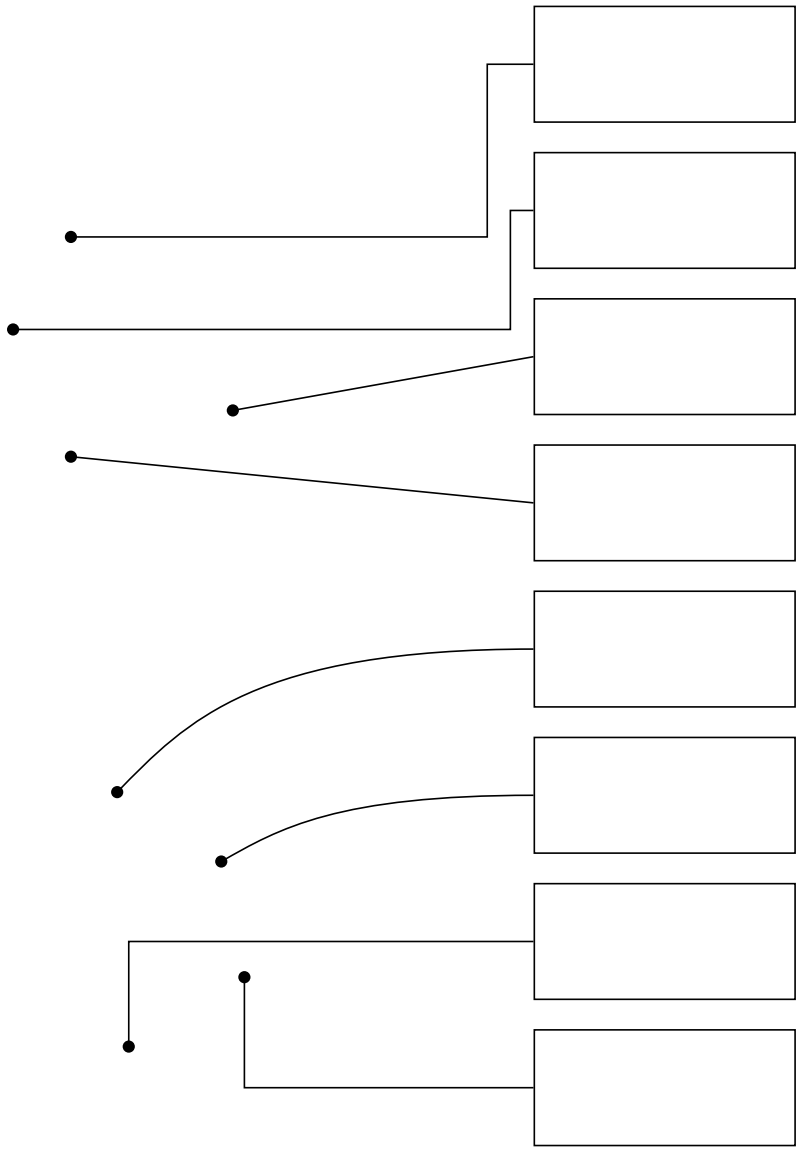
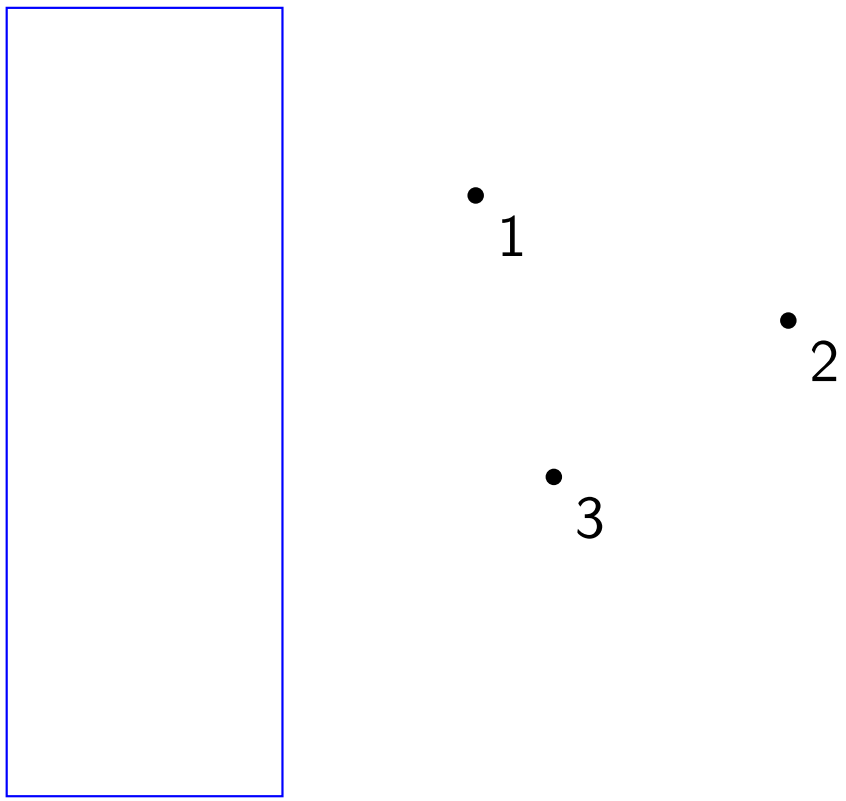
- **s-leaders**
- **Bézier curves (based on *s*-leaders)**
- *po*-leaders



s-leaders



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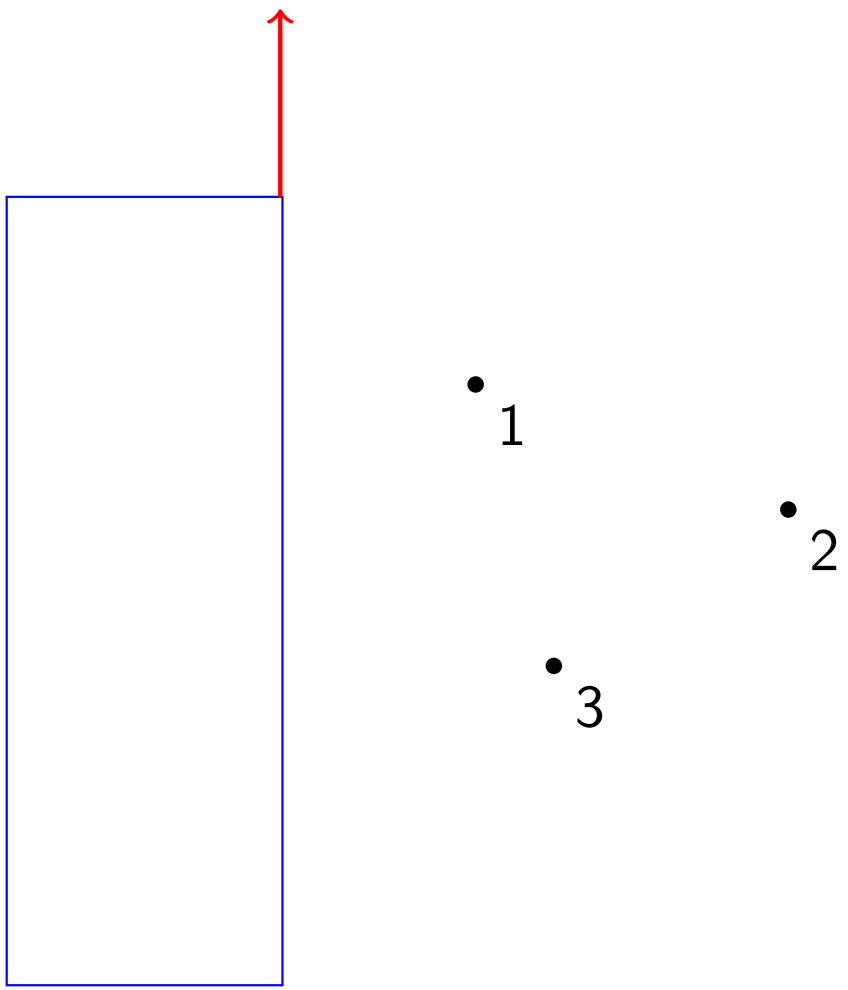
- No crossings between leaders
- Algorithm: Emit ray from next anchor to the top and rotate it clockwise [Bekos, Kaufmann, Symvonis, Wolff, 2007]

s-leaders



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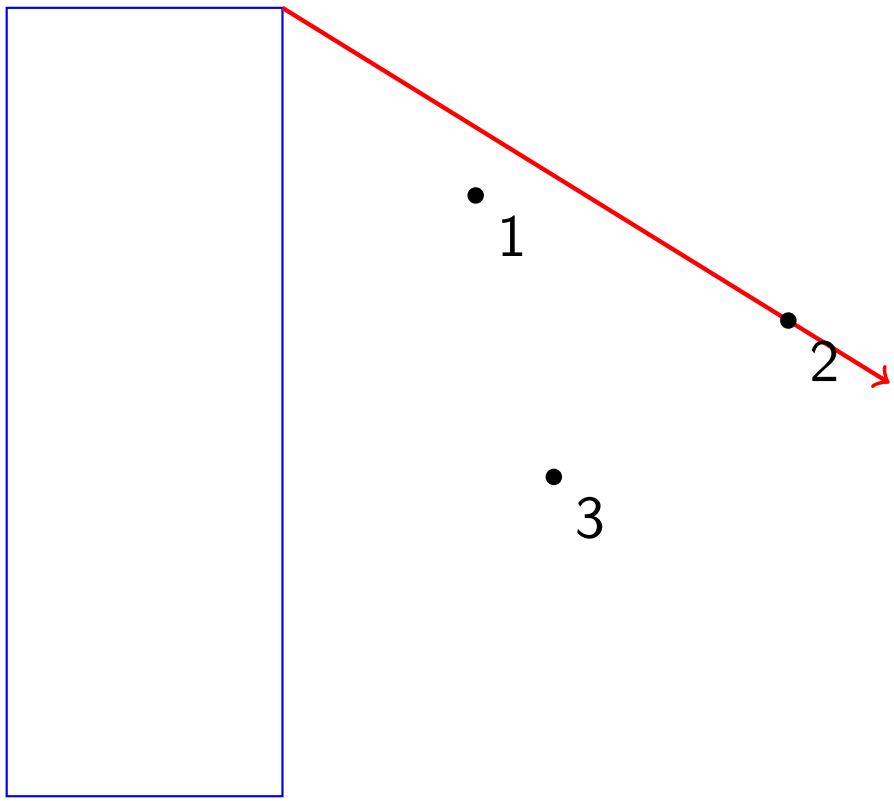

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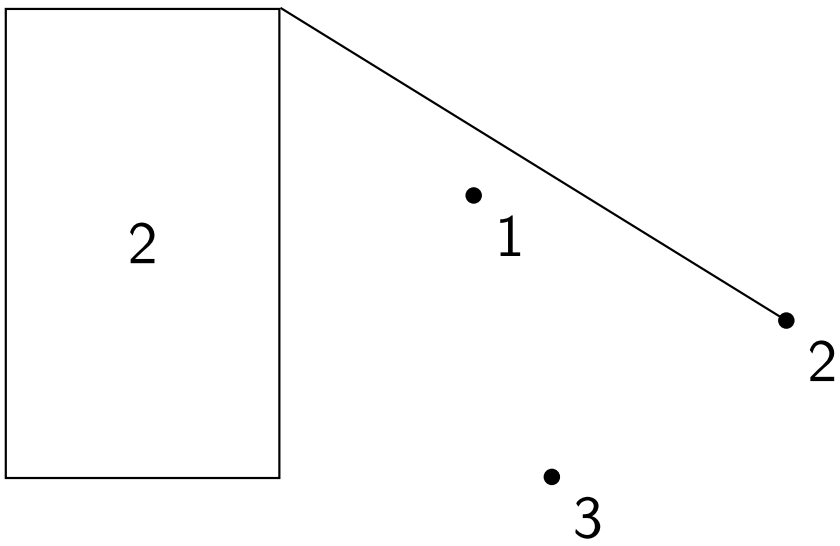

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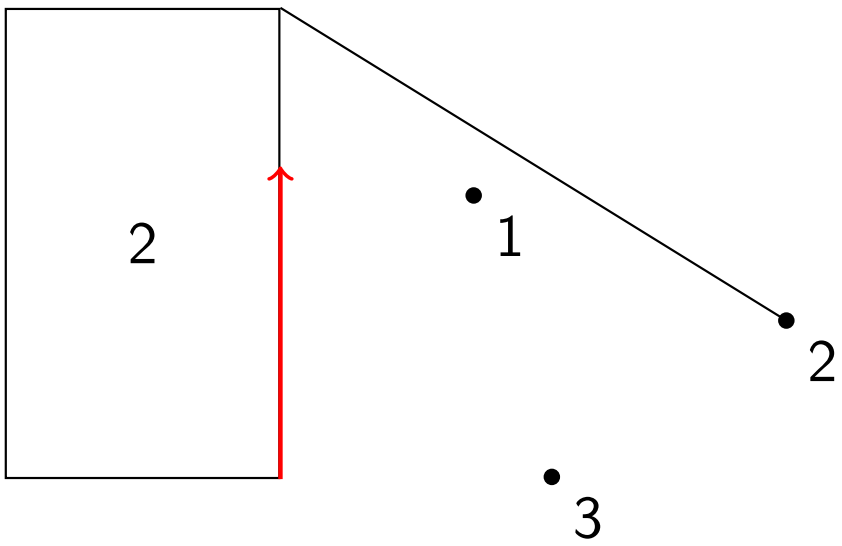

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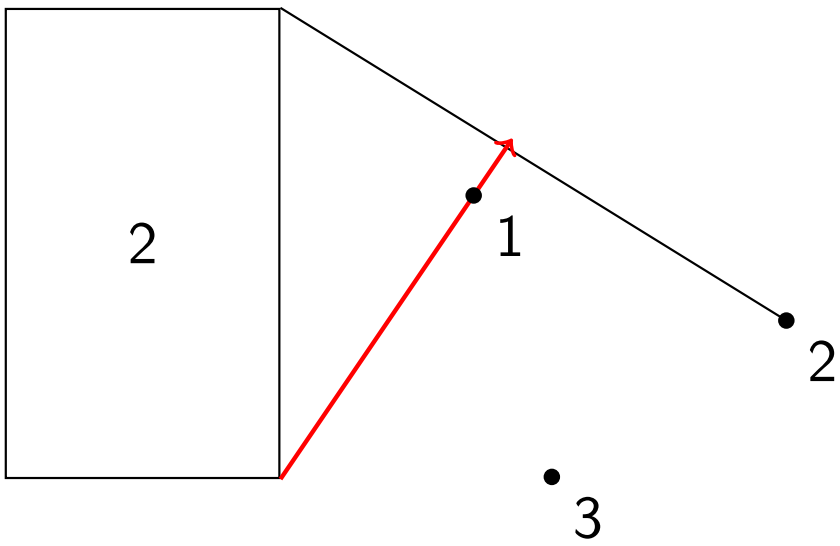

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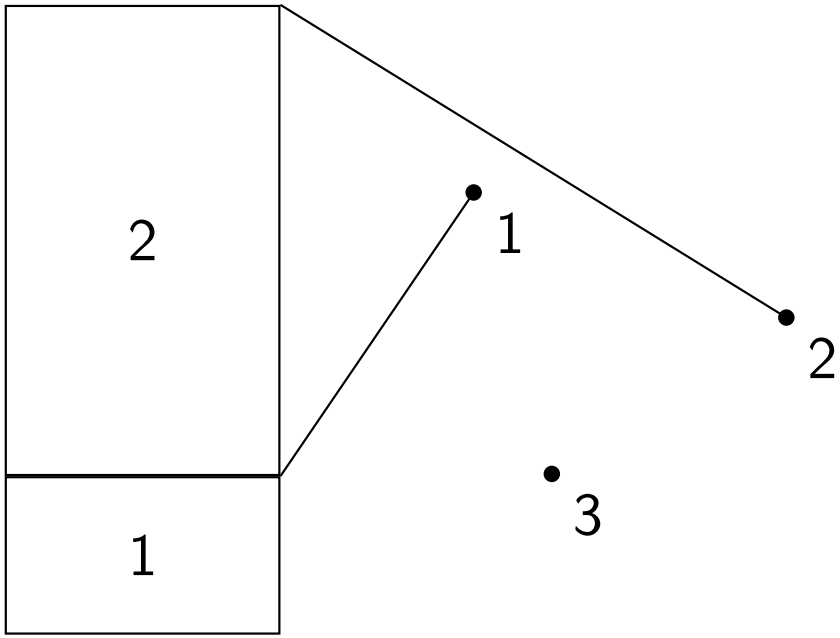

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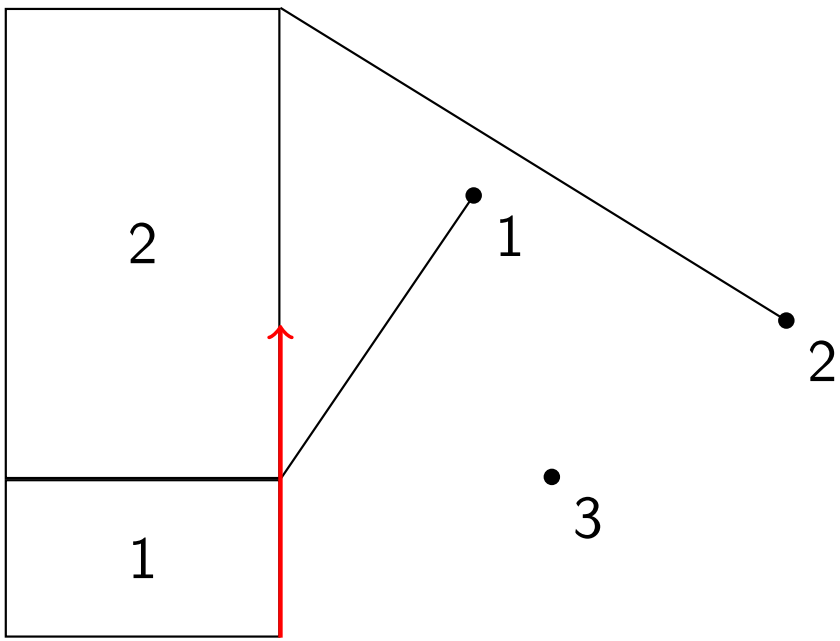

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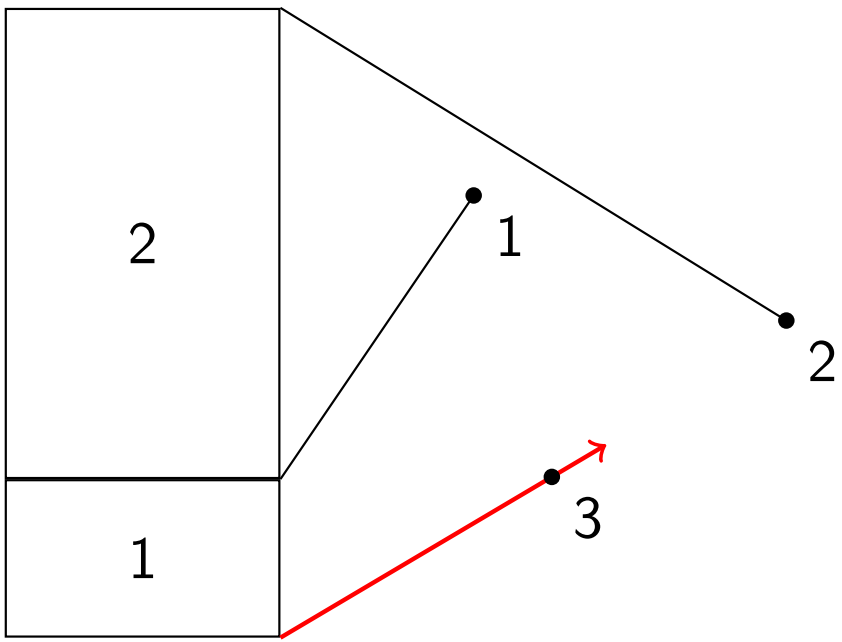

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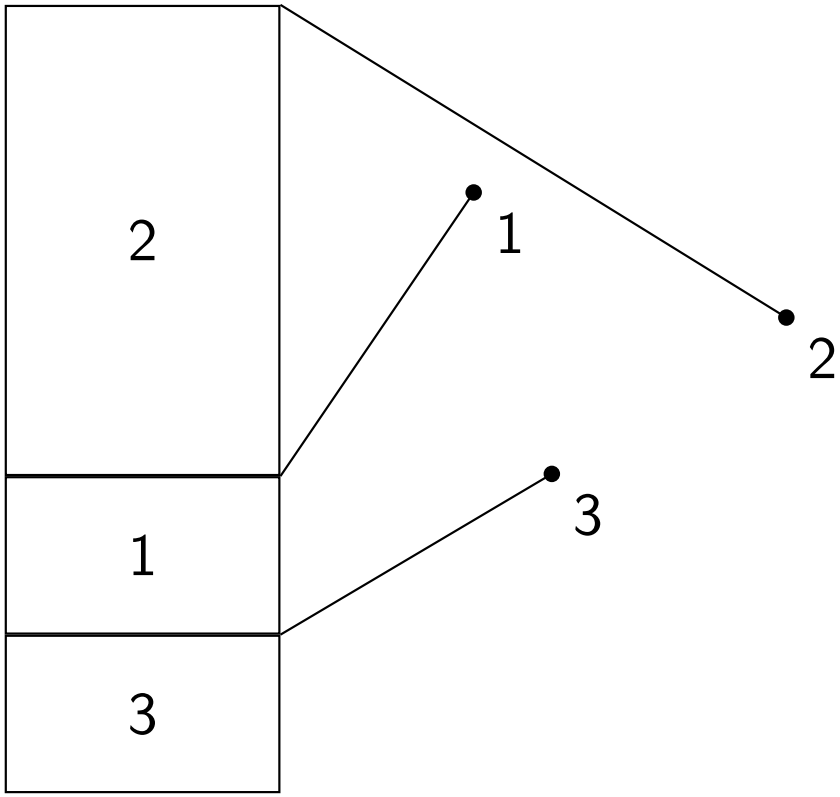

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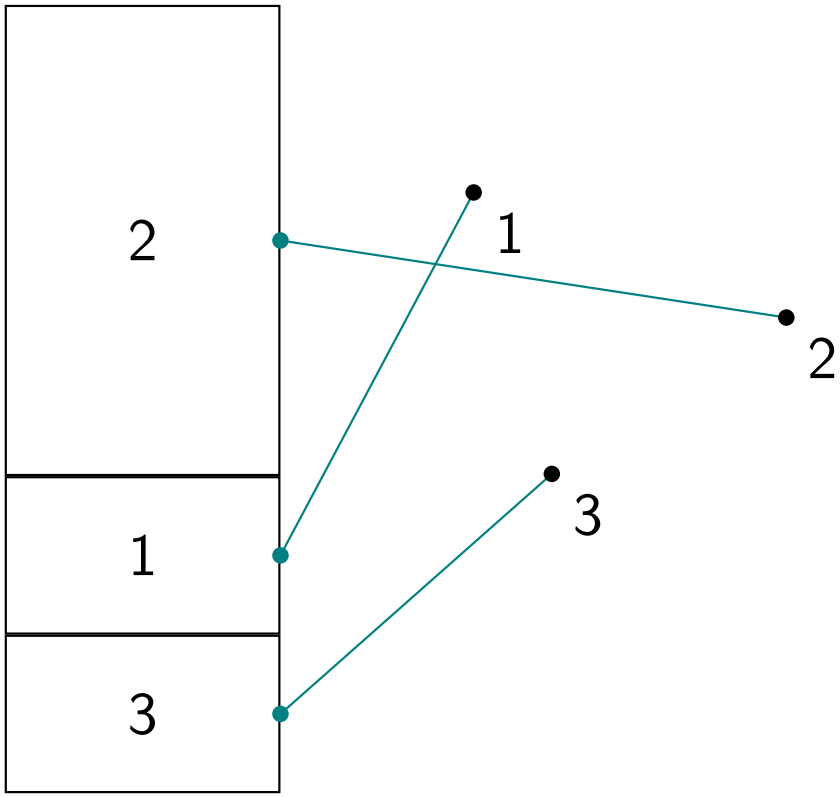

- Alternative: Anchor leader at center of label

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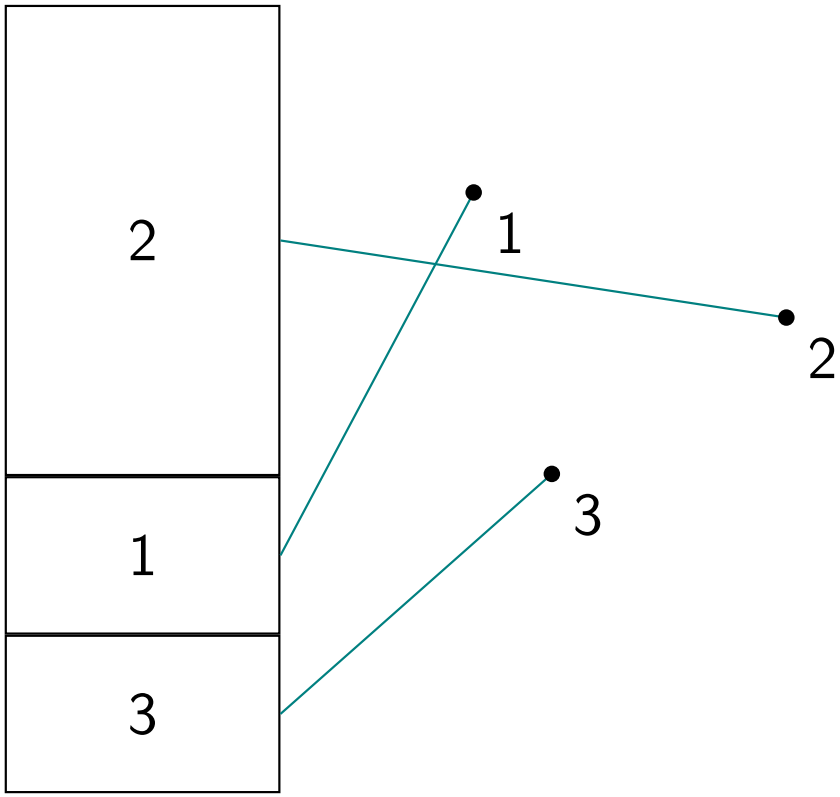

- Alternative: Anchor leader at center of label
- Here: Need to swap labels 2 and 1

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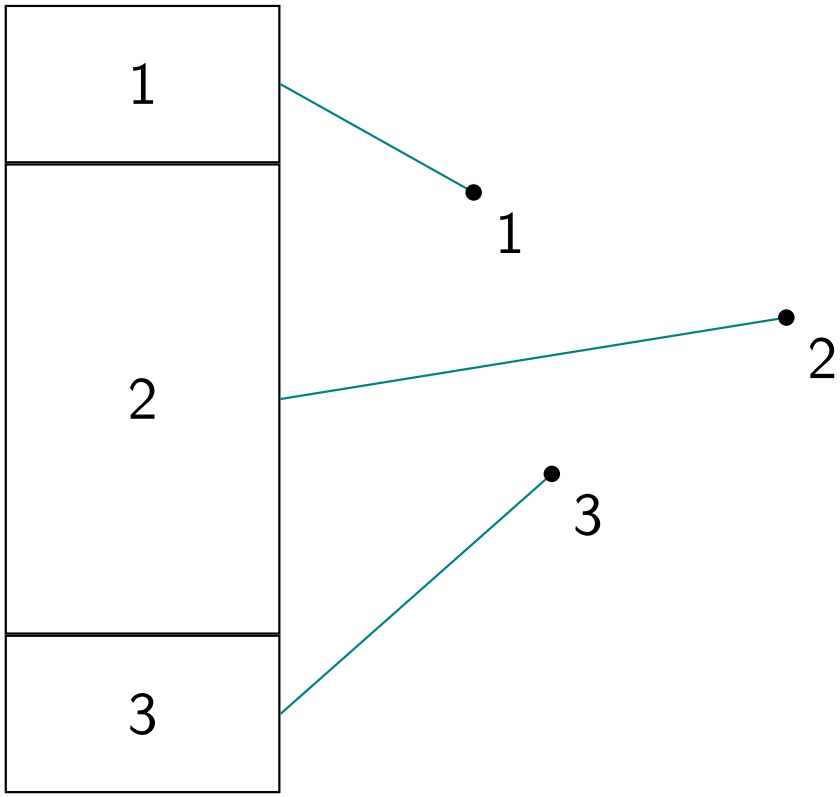

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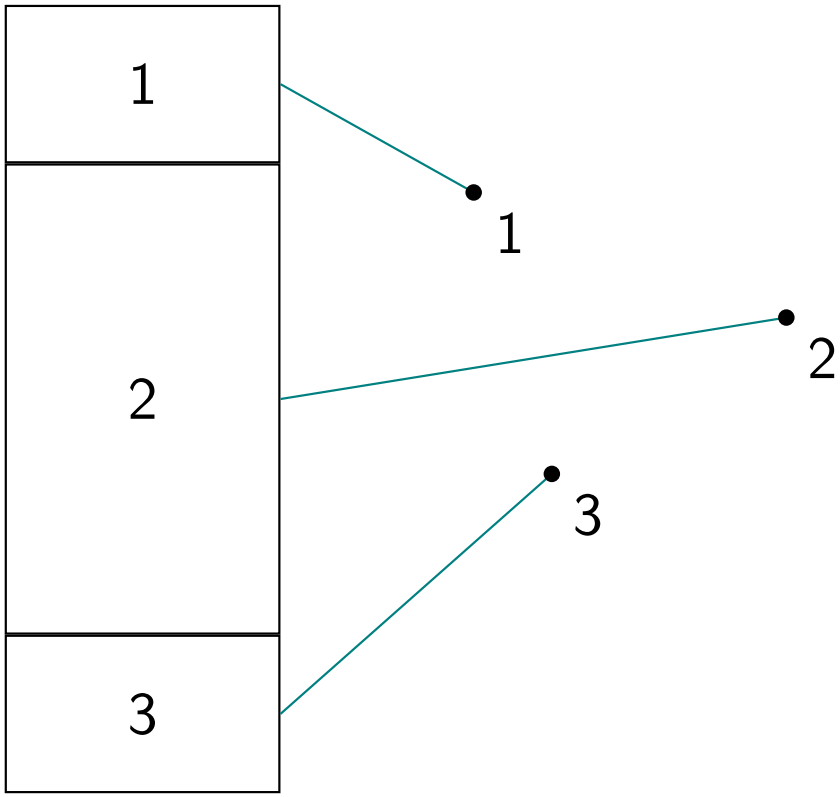

- Alternative: Anchor leader at center of label
- Here: Need to swap labels 2 and 1
- Easy with uniform labels

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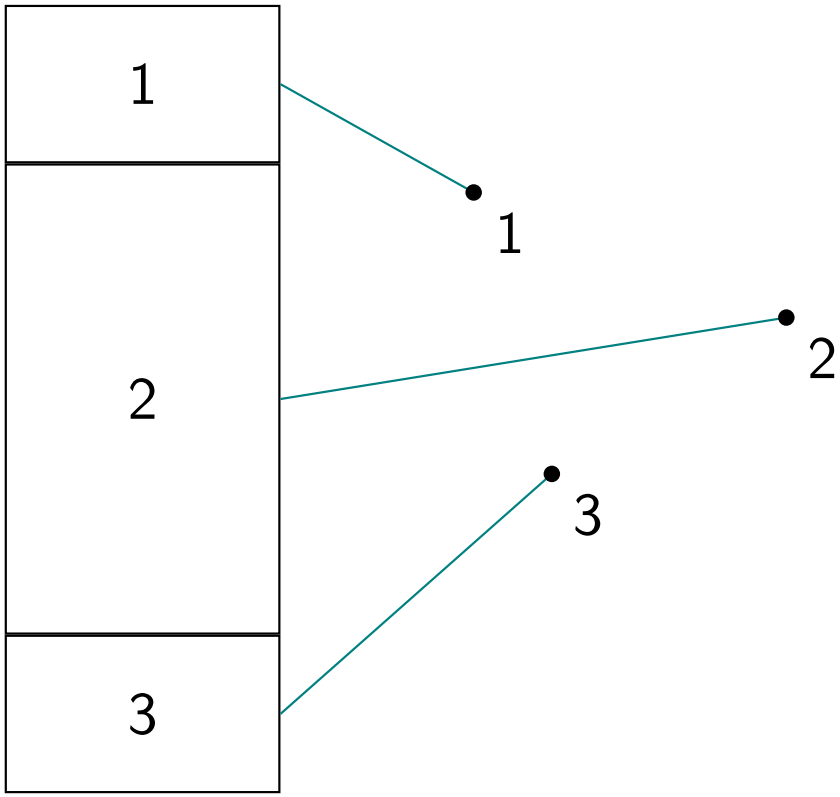
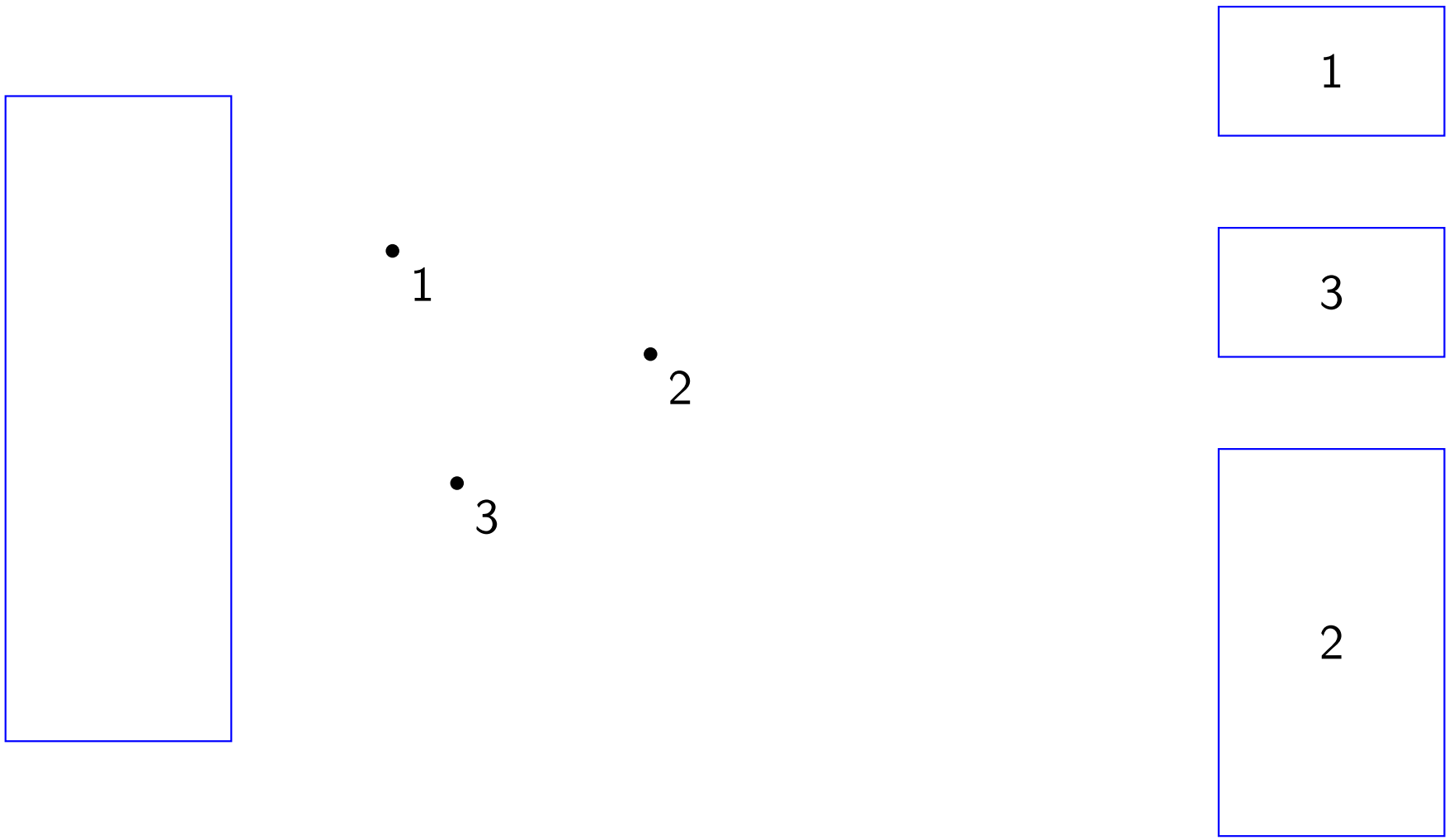


- Alternative: Anchor leader at center of label
- Here: Need to swap labels 2 and 1
- Easy with uniform labels
- For non-uniform labels: no algorithm known to compute order of labels for given site positions and label heights (no gaps, no crossings allowed)
- Problem: we don't know position of next anchor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

Heuristic for s-leaders



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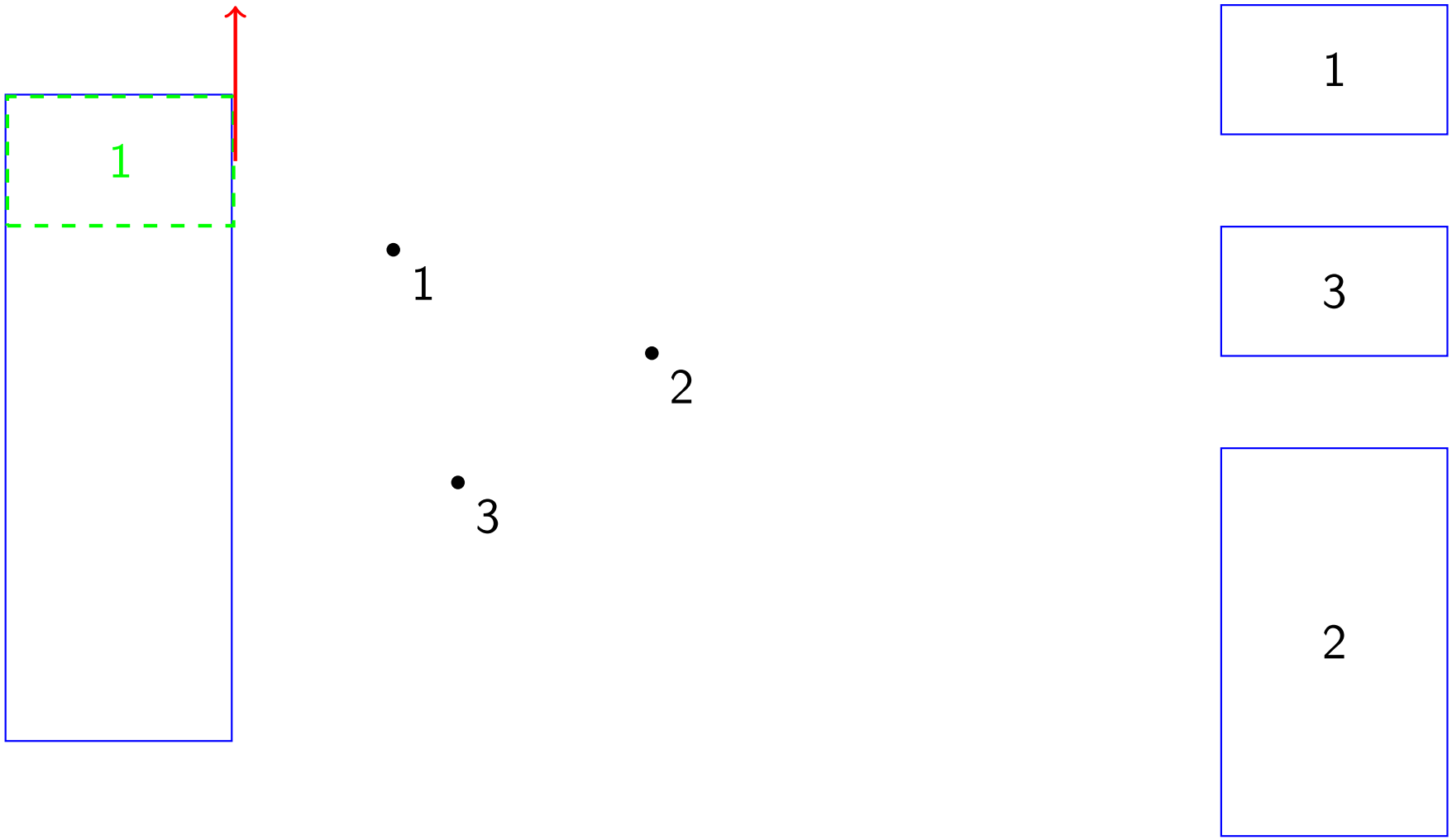

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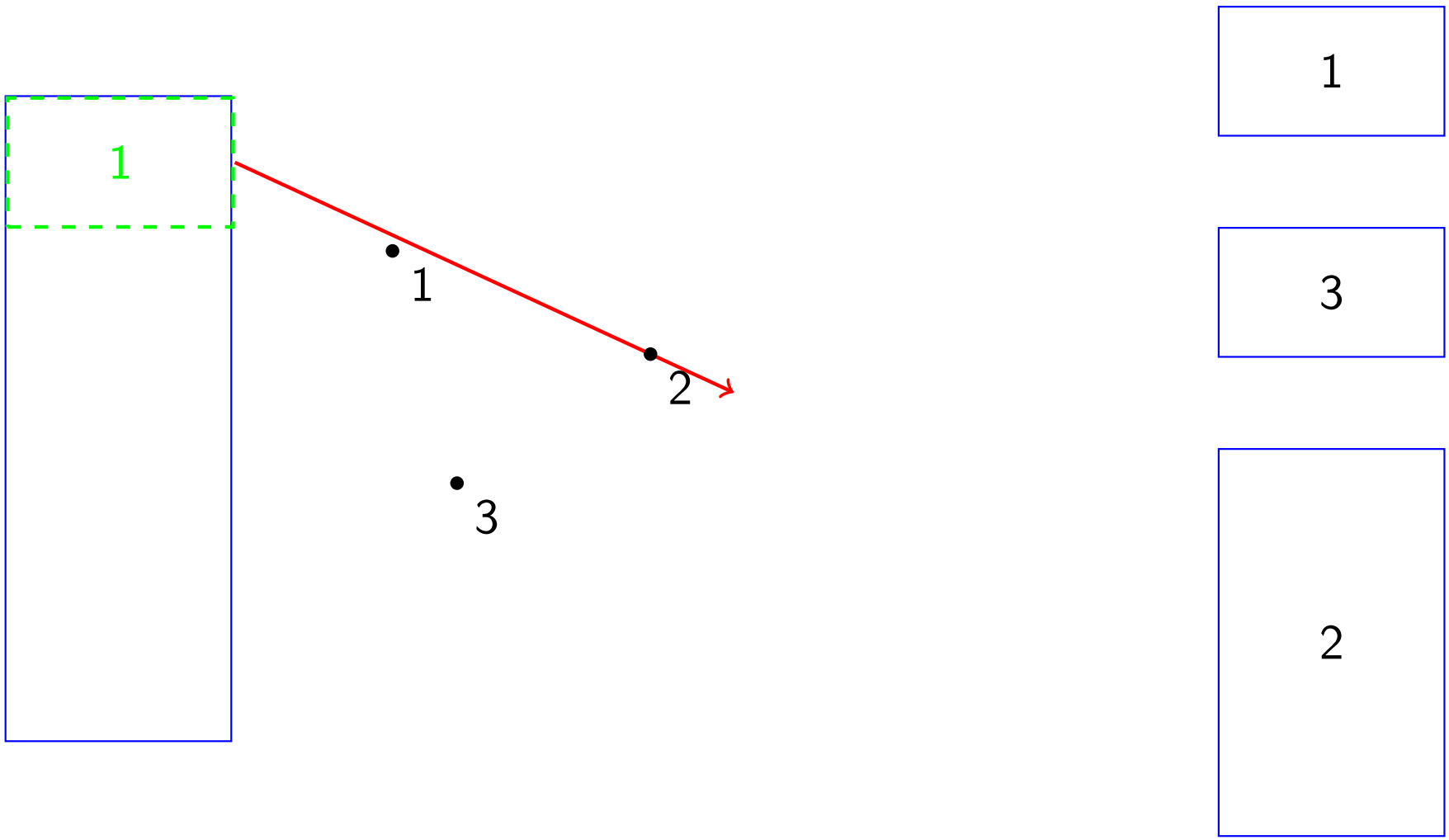

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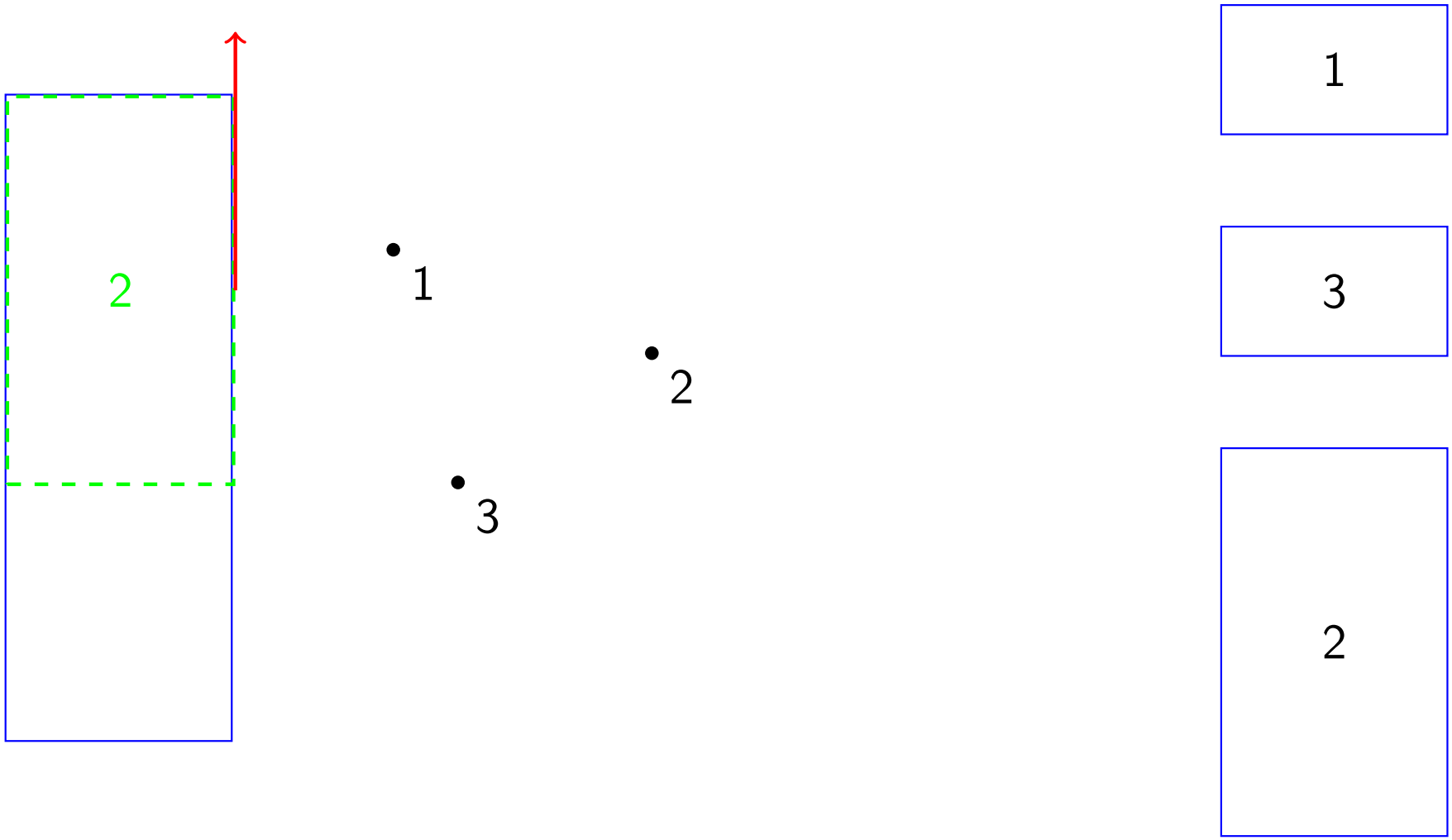

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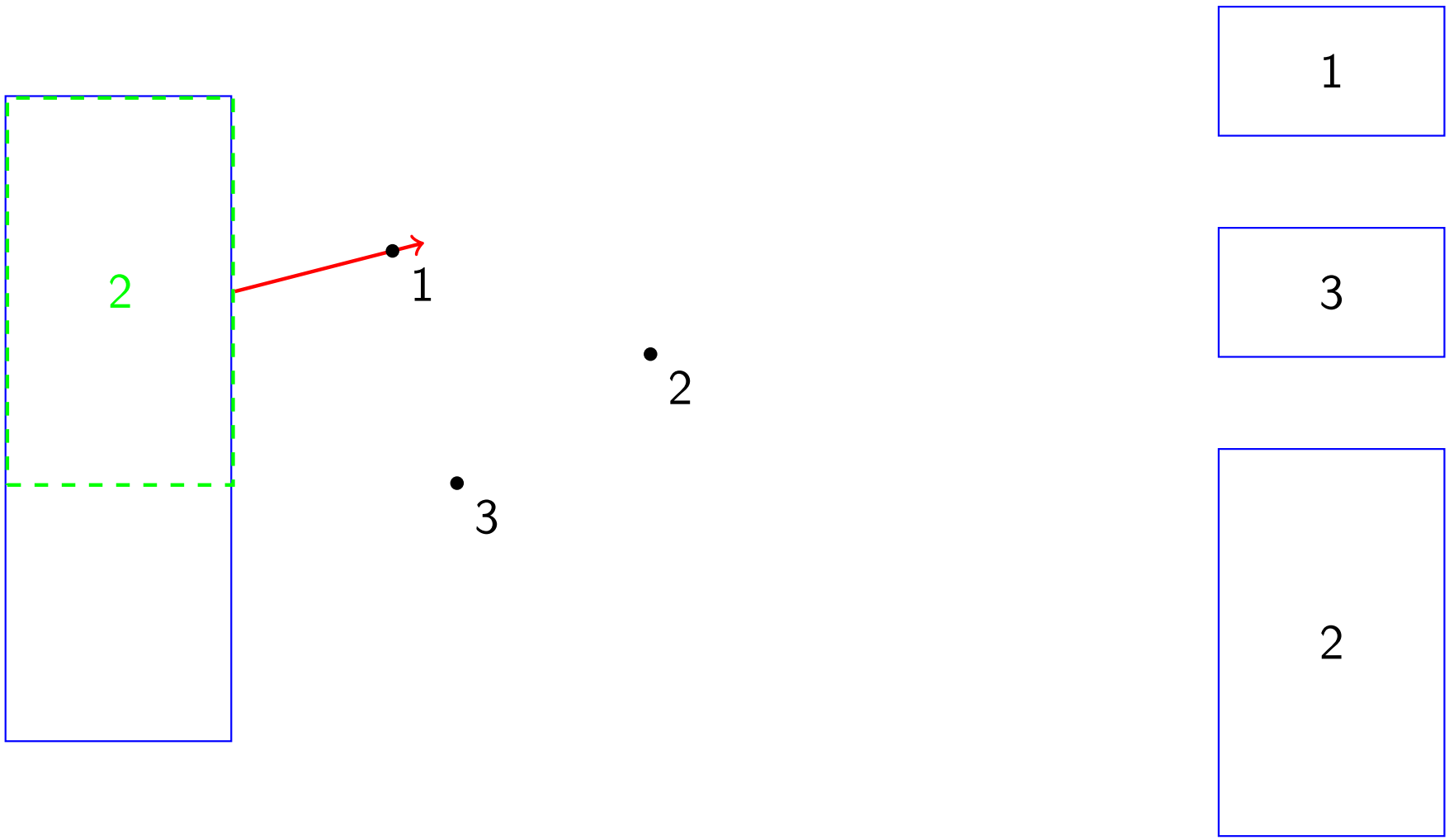

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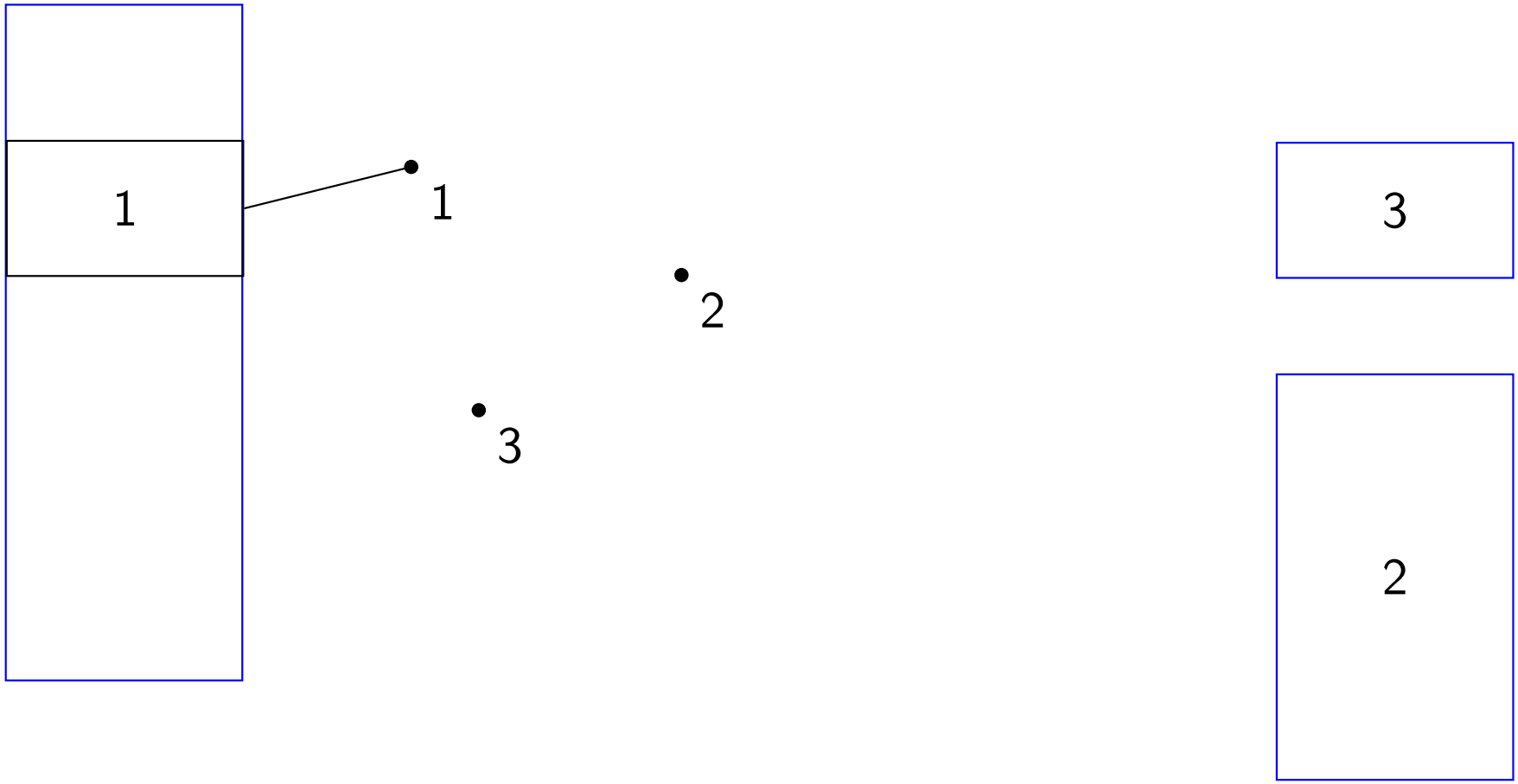

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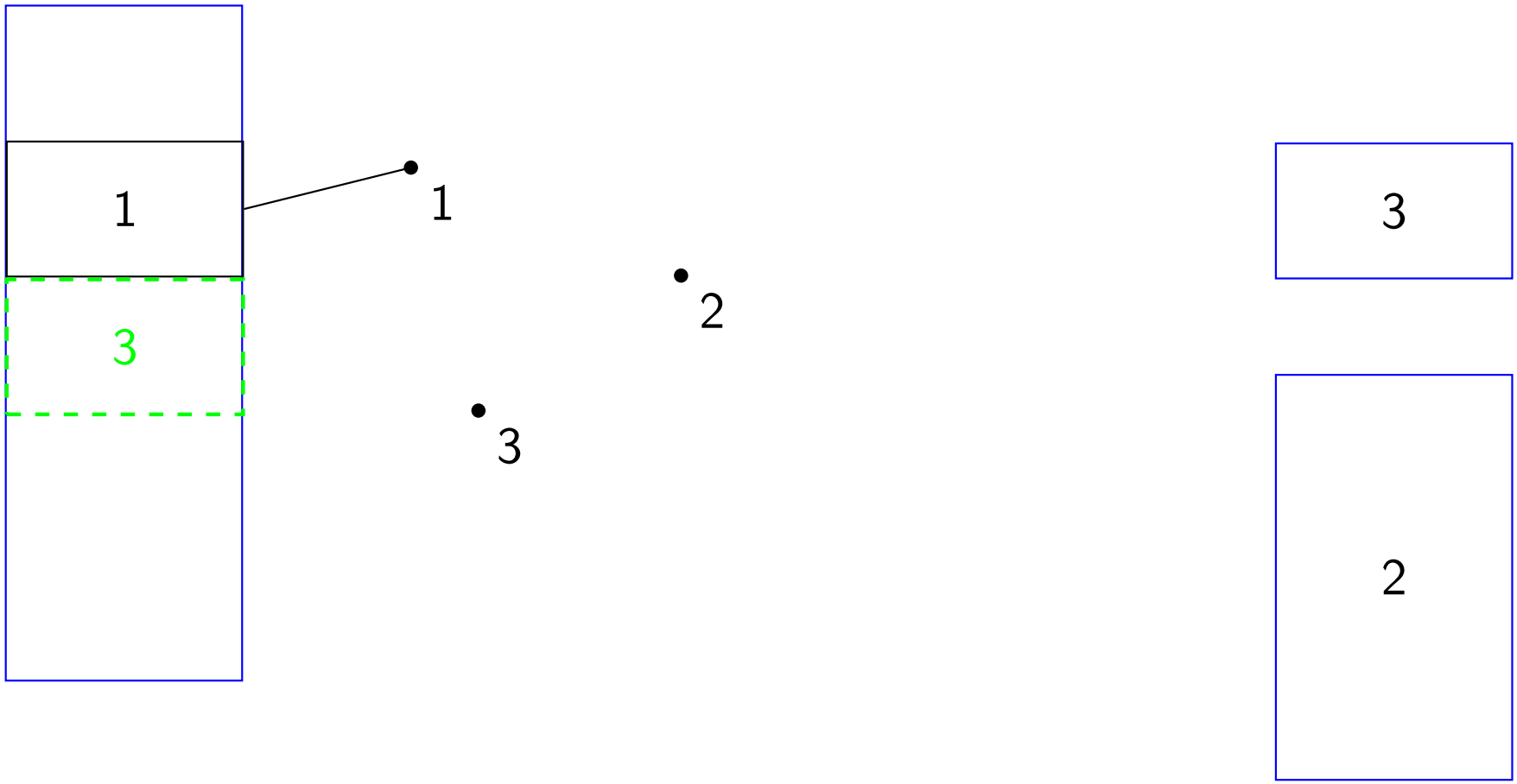

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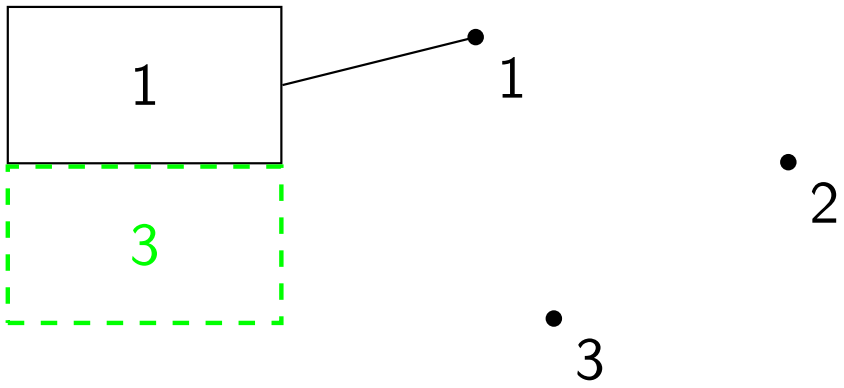
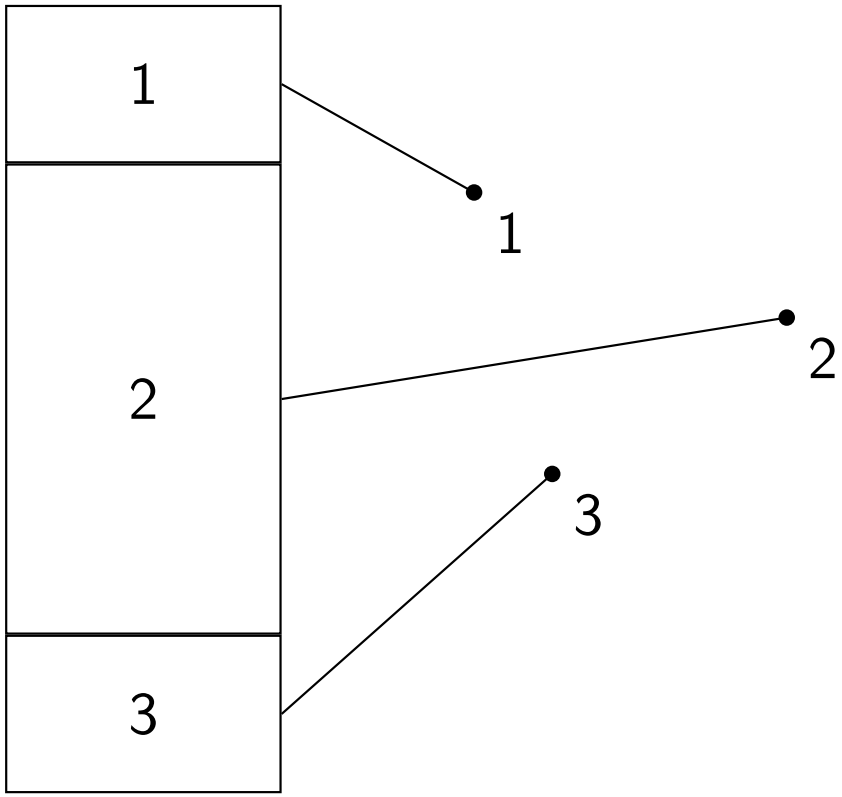


Characteristics

- 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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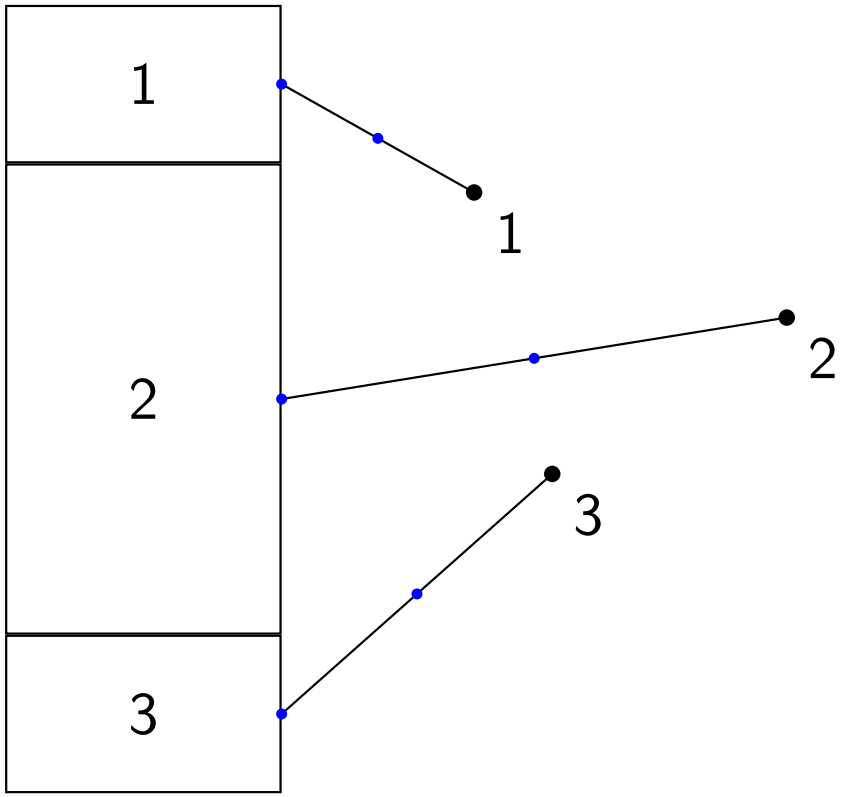

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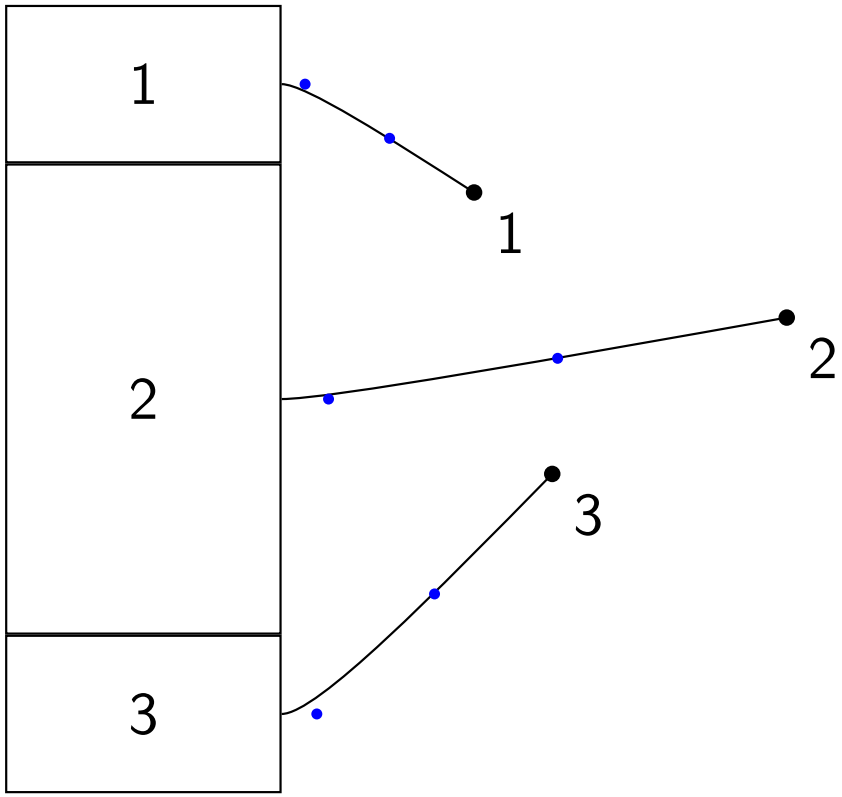

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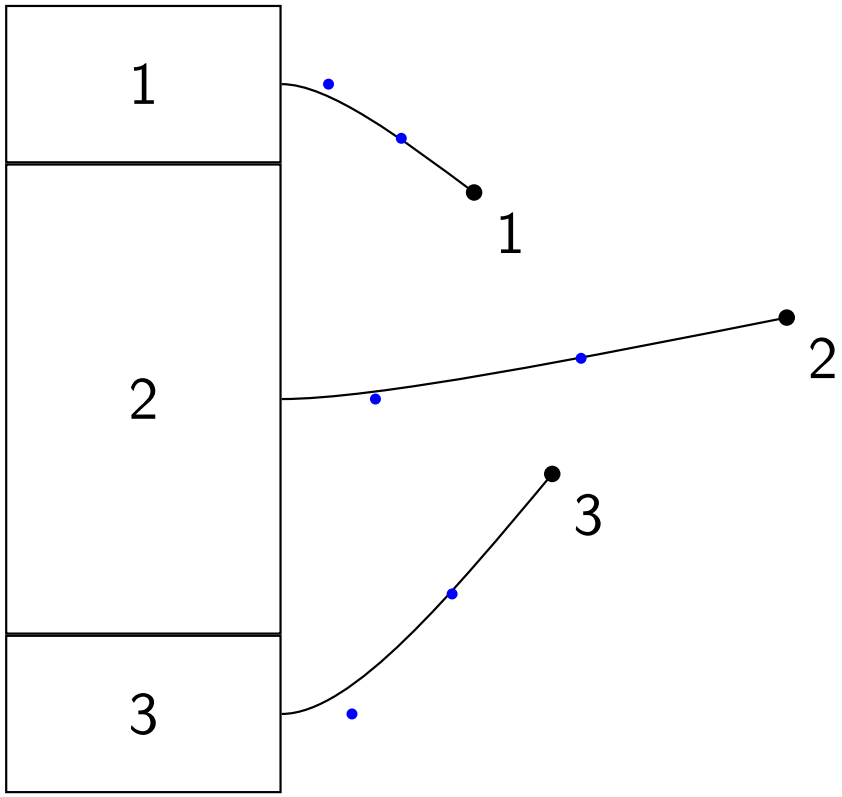

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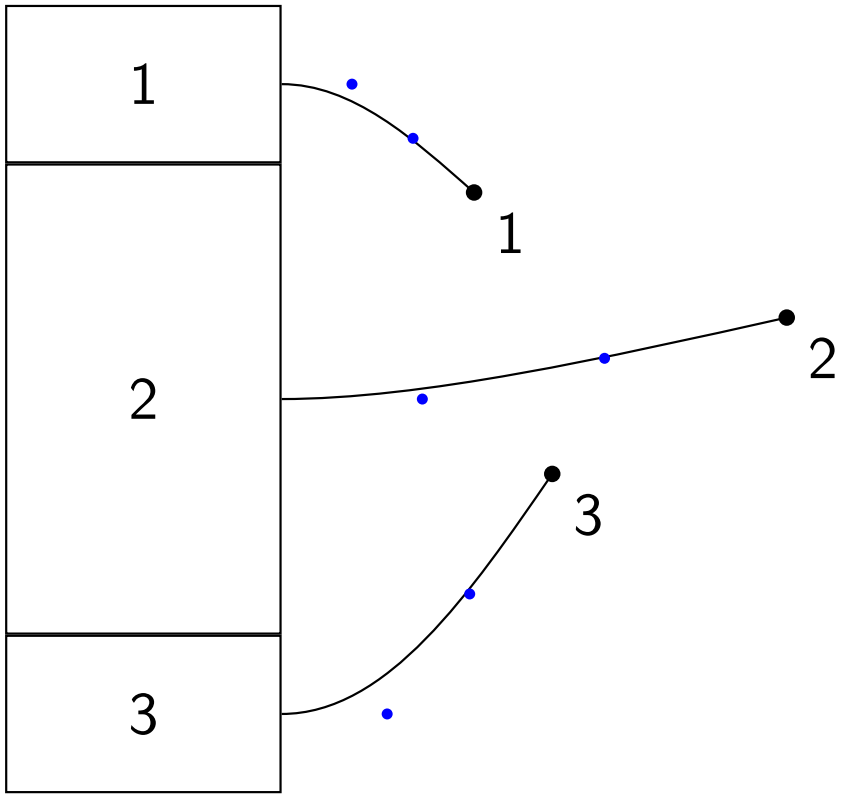

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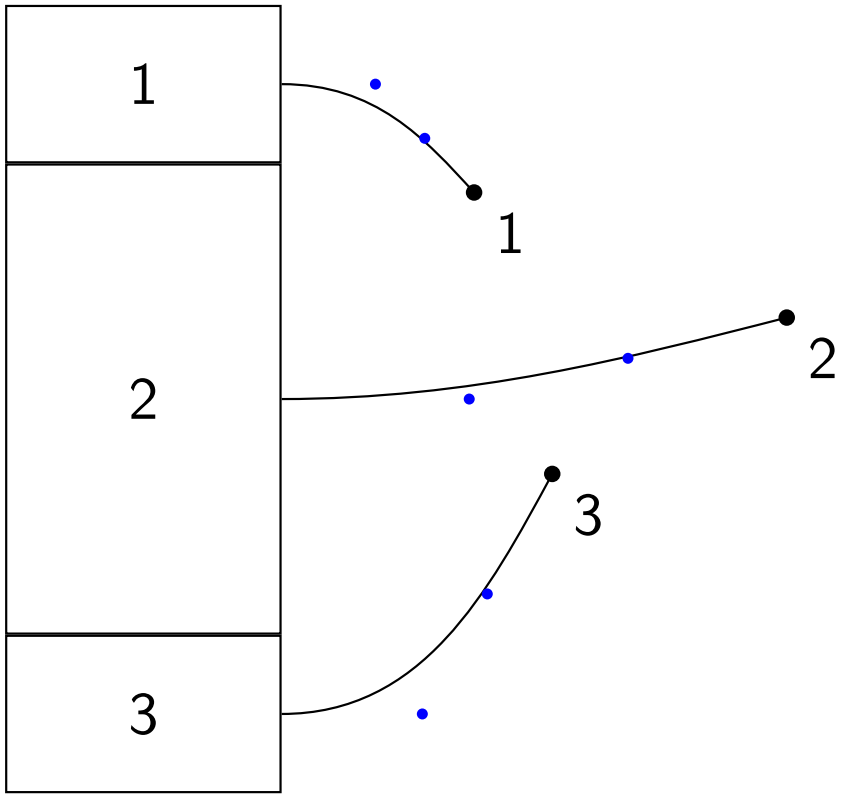

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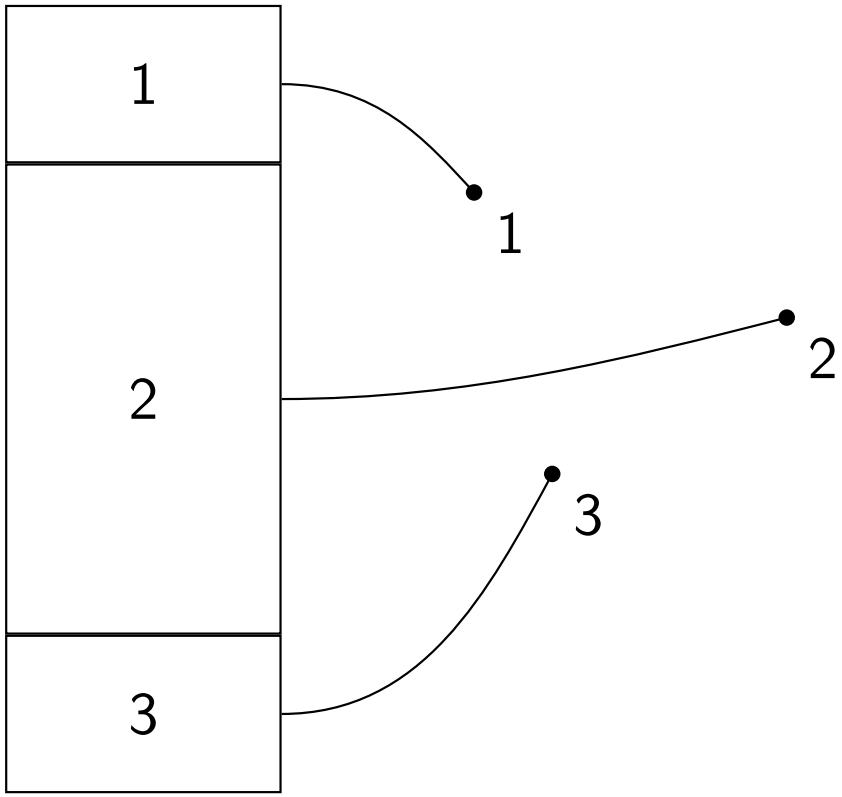

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Experimental Results

- Implementation as a LaTeX package
- Different leader types can be chosen

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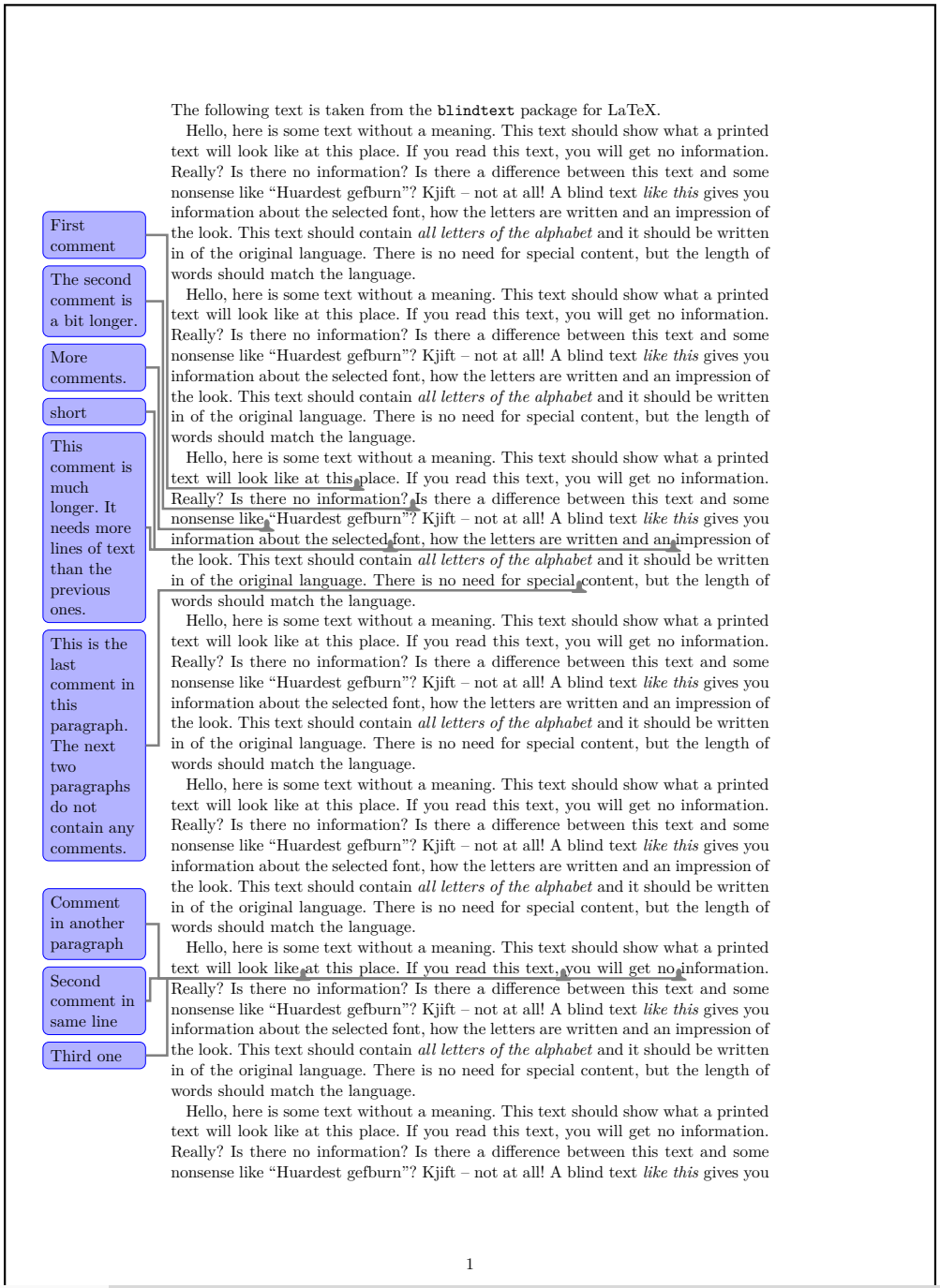

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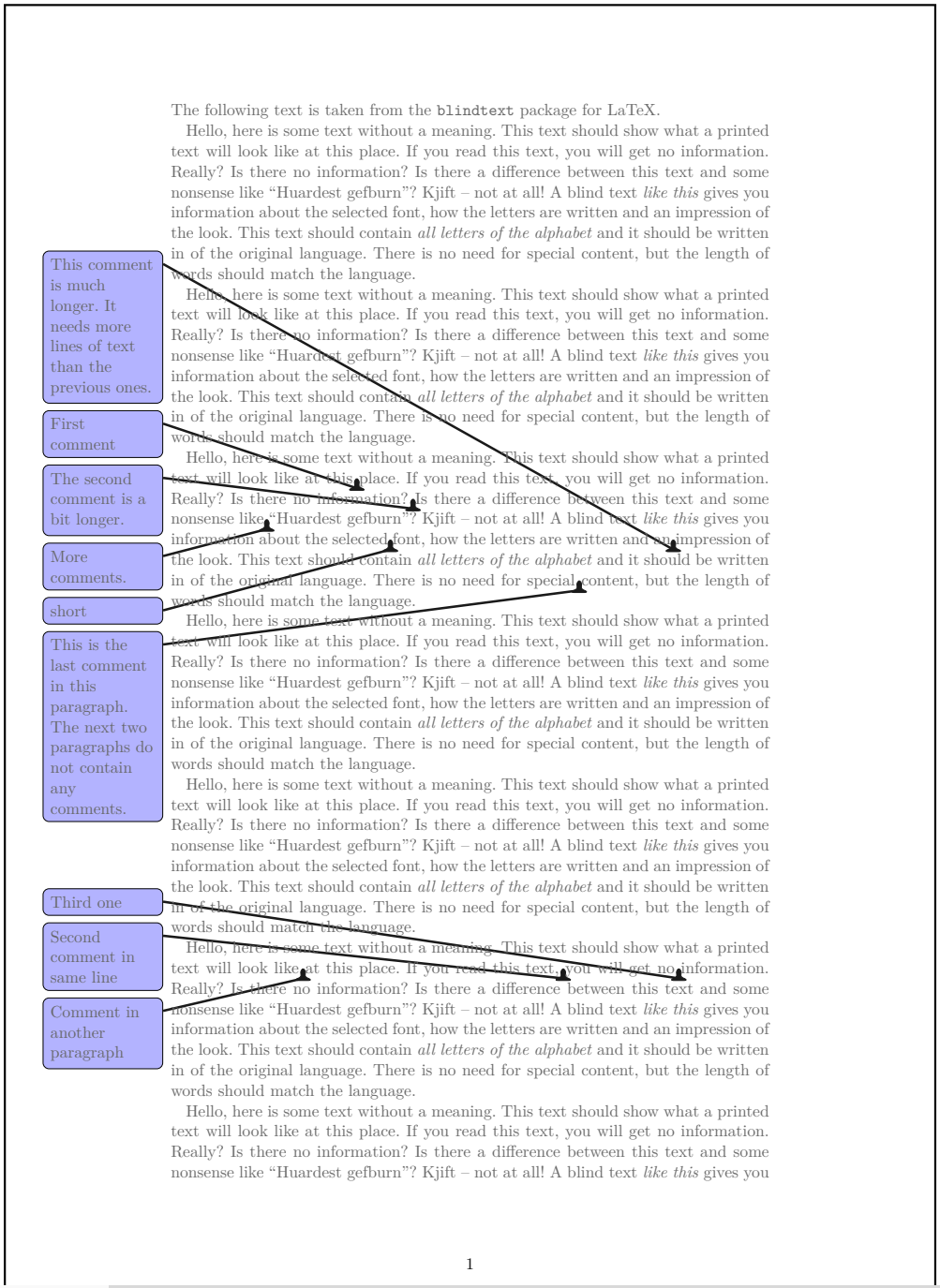
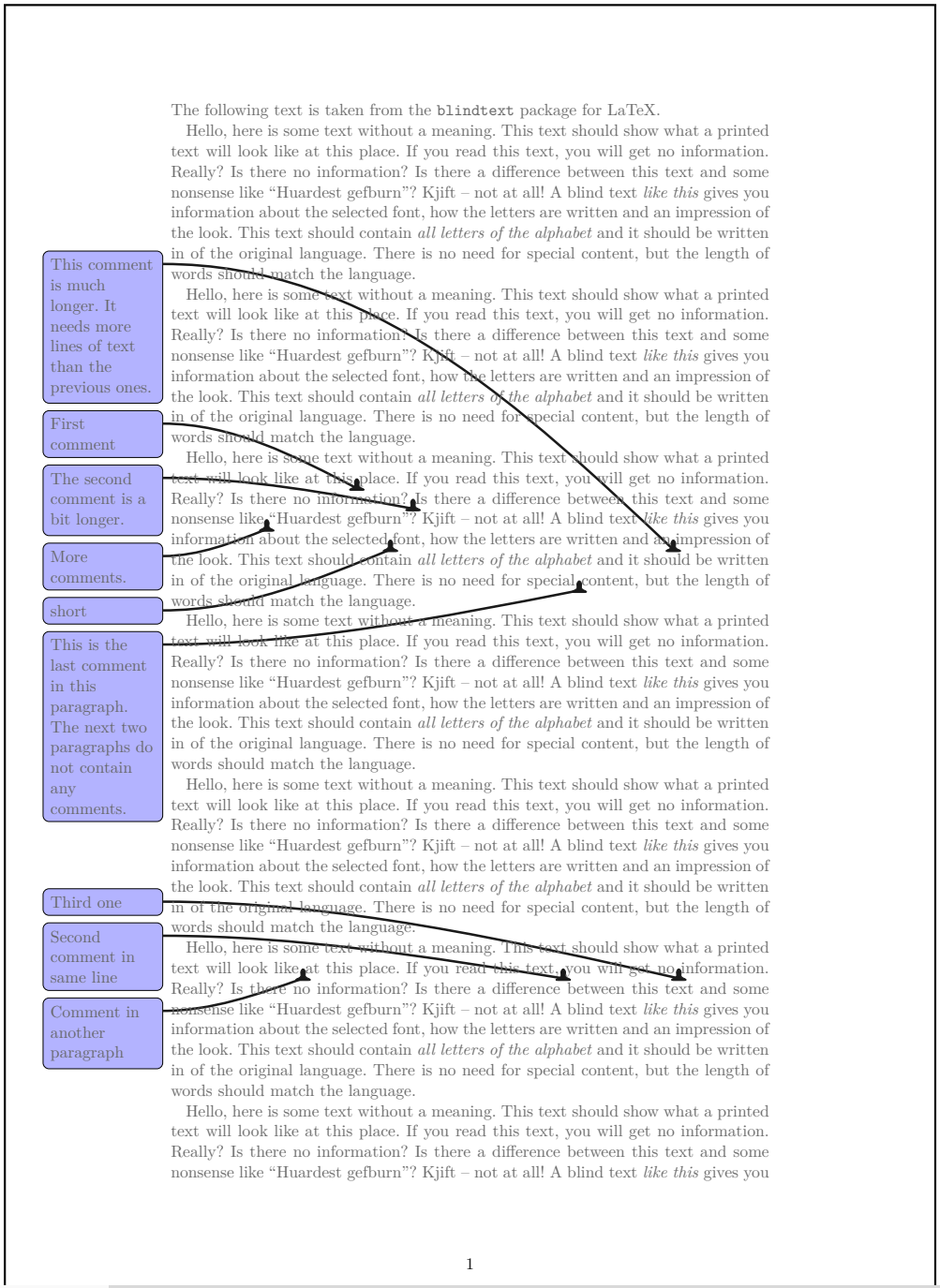


Experimental Results

- Implementation as a LaTeX package
- Different leader types can be chosen

Leader types

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



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- Based on the `todonotes` package
- Using modern TEX processor LuaTEX:
  - can use high-level programming language Lua inside our LATEX package
  - Included in every modern TEX distribution
- Easily extensible

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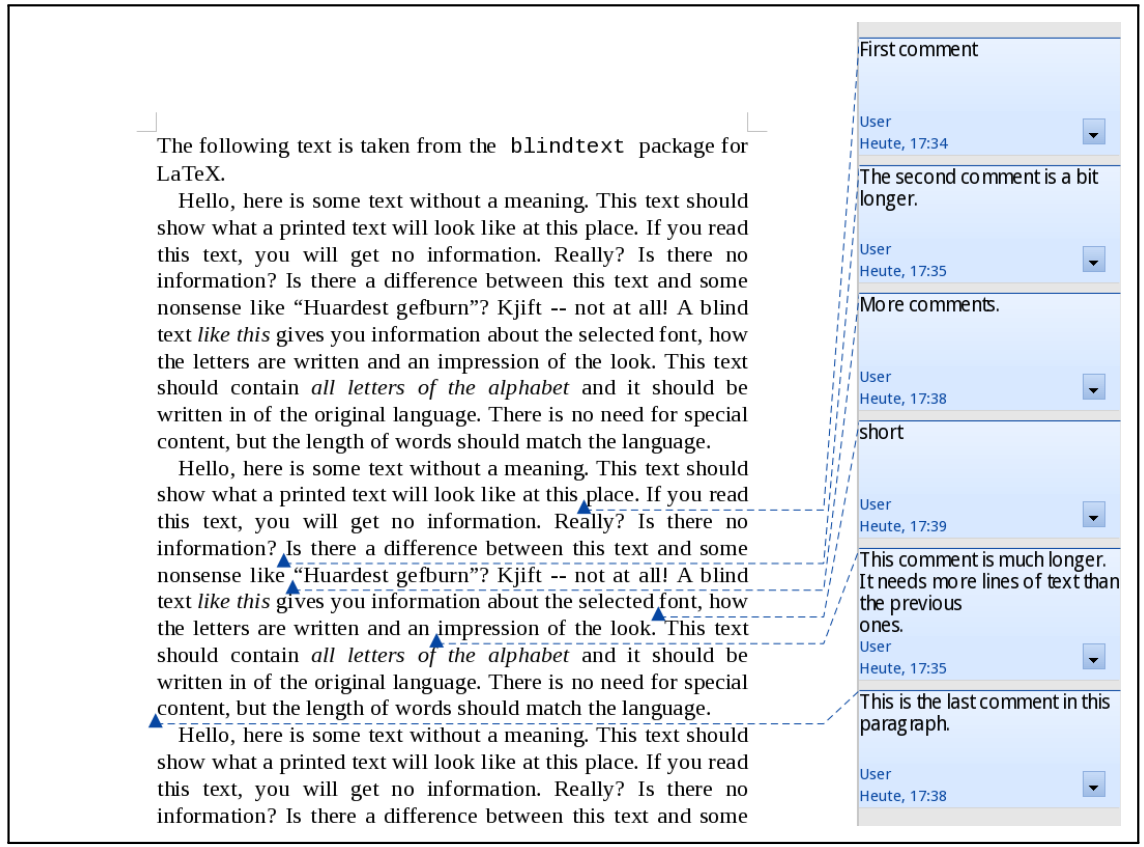
Thank you!

APPENDIX

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



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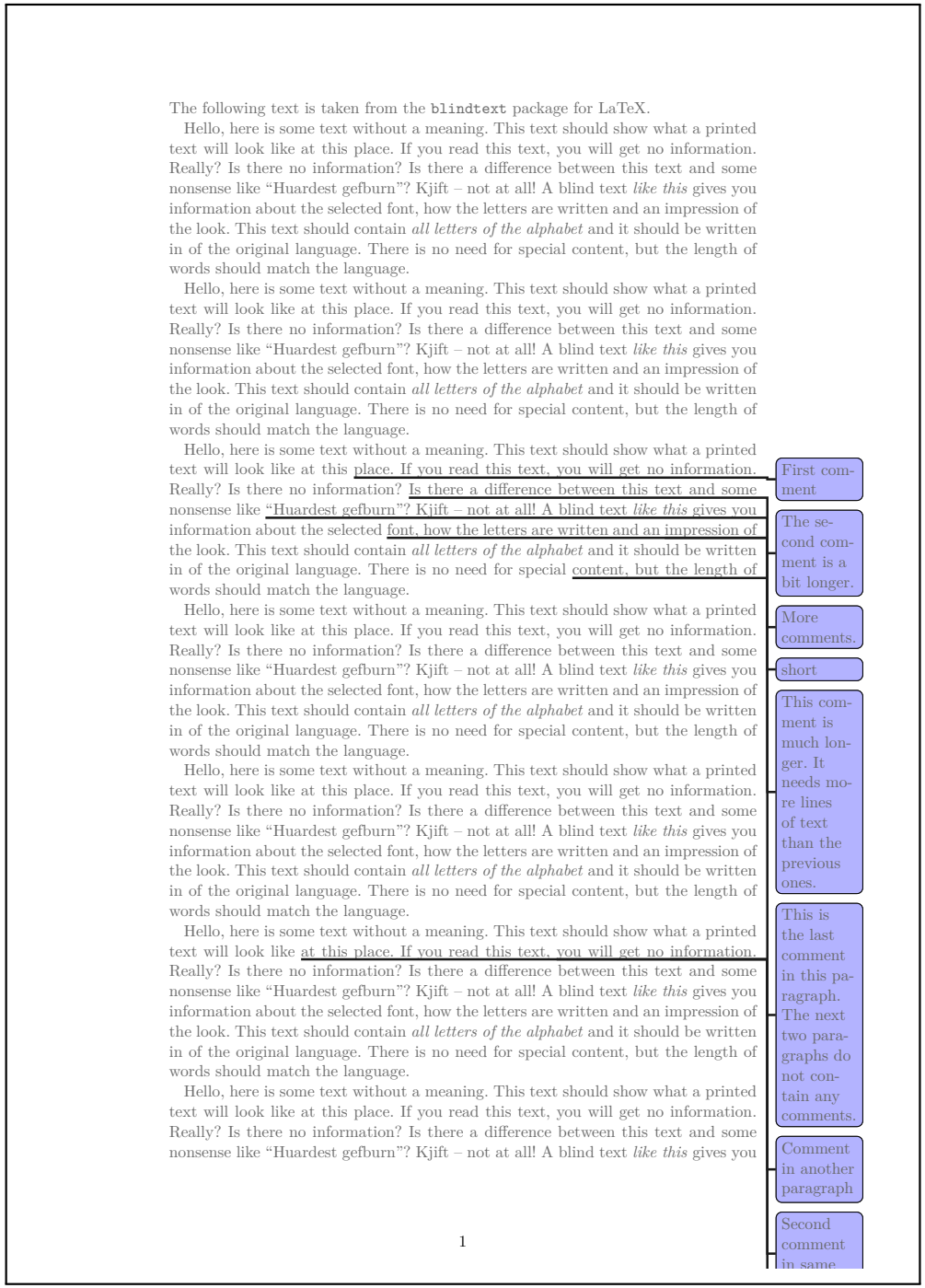

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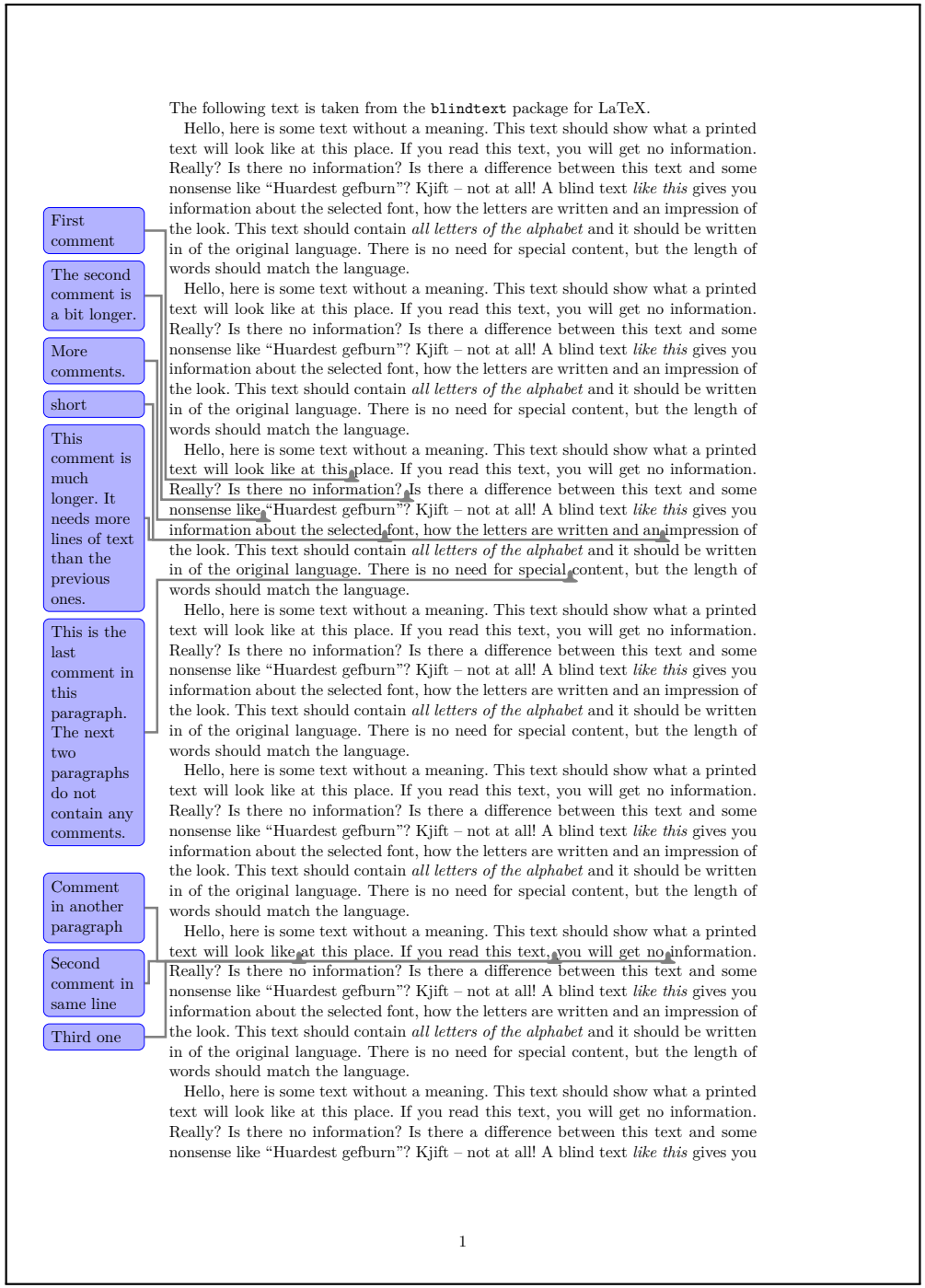

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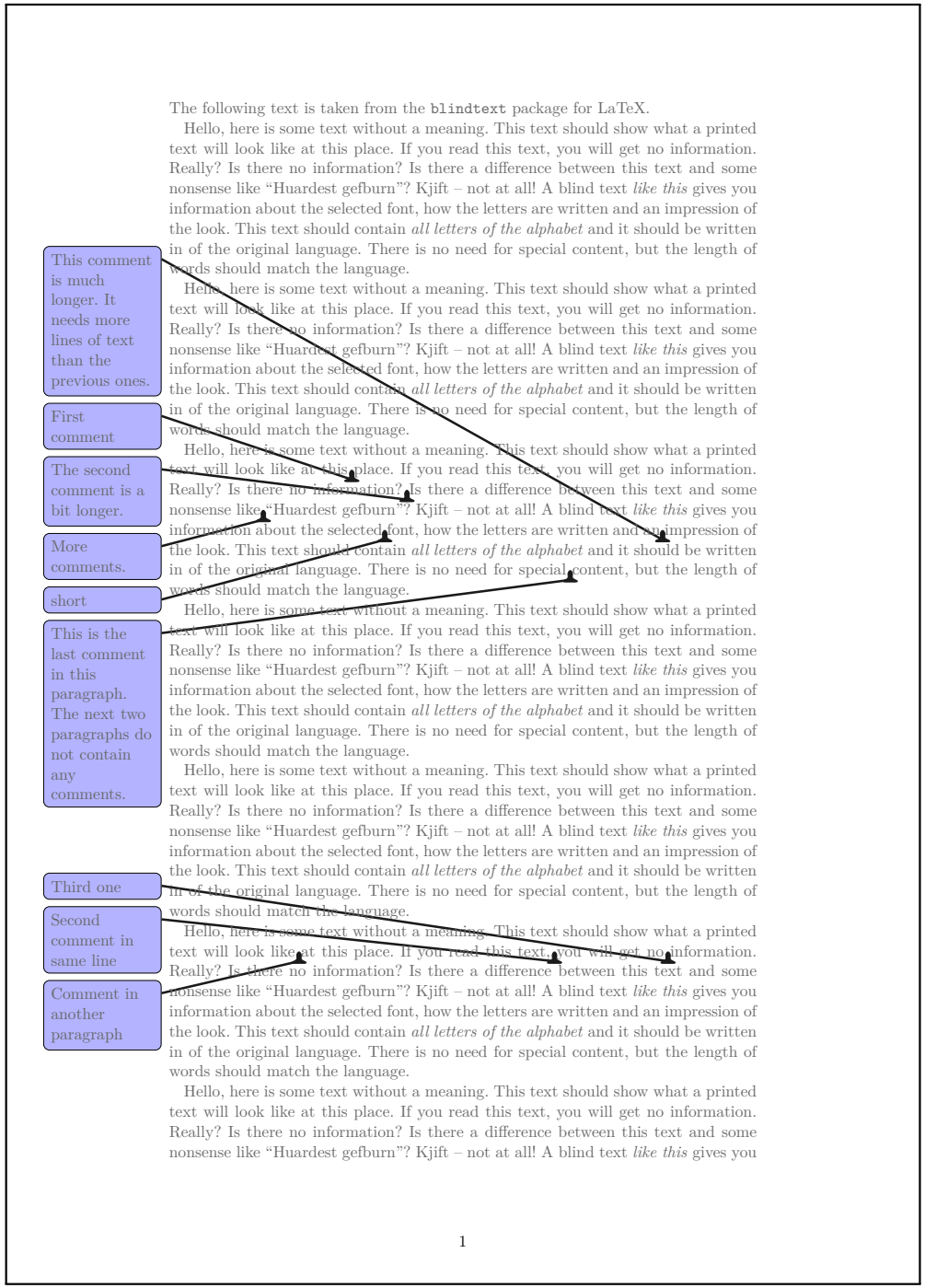
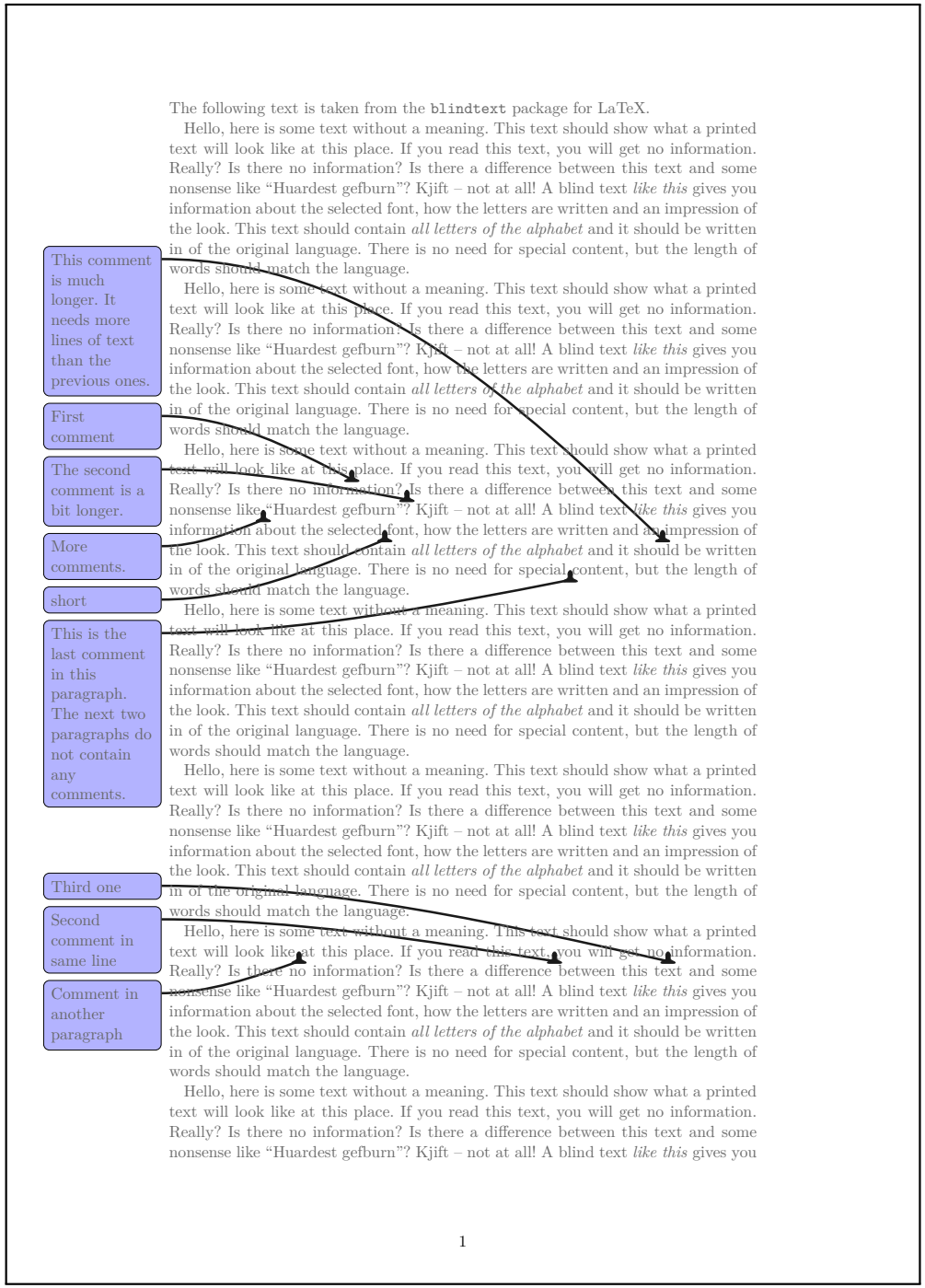
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