Port-Aware Node Placement in a Layered Layout Algorithm

Sven Oliver Reimers

Christian-Albrechts-Universität zu Kiel

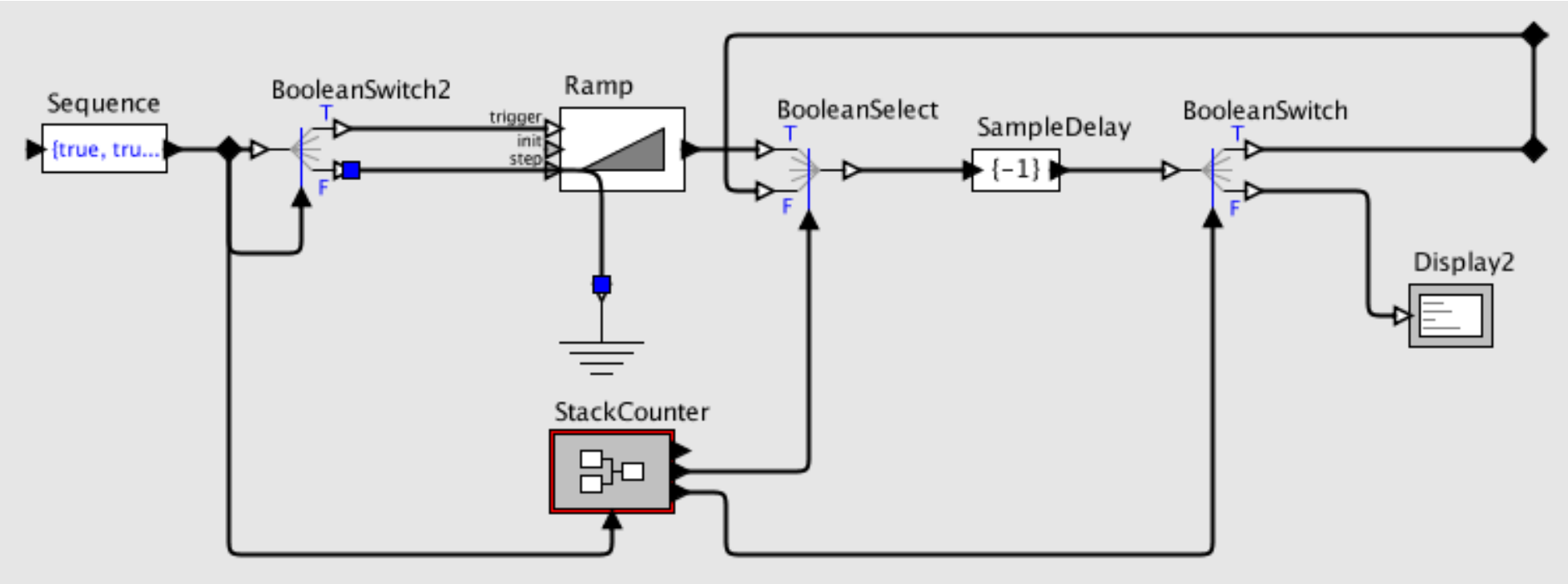
sor@informatik.uni-kiel.de

August 26, 2014

Overview

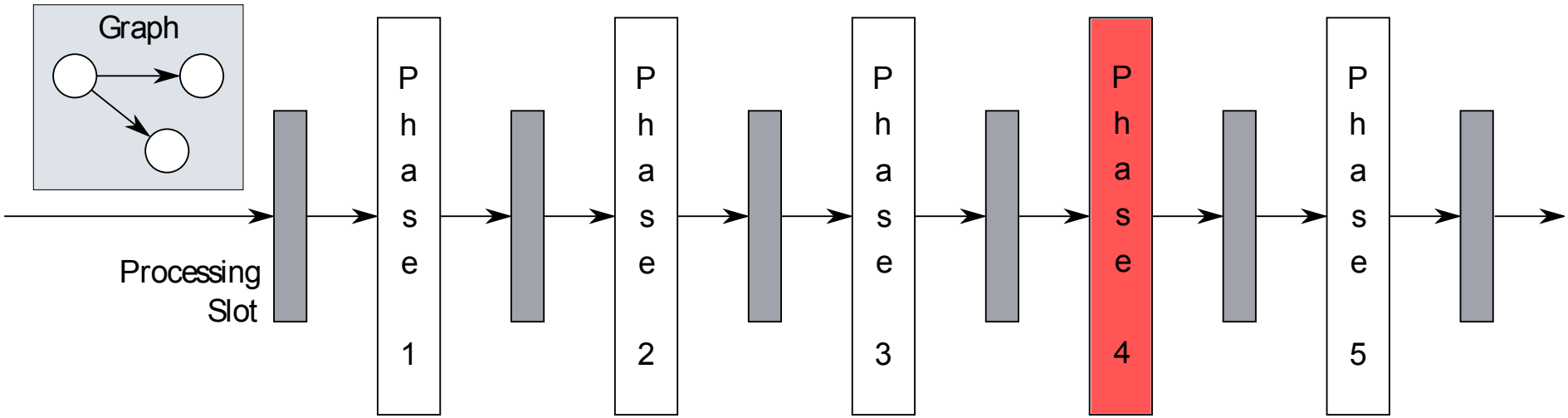
Outline

KLay Layered



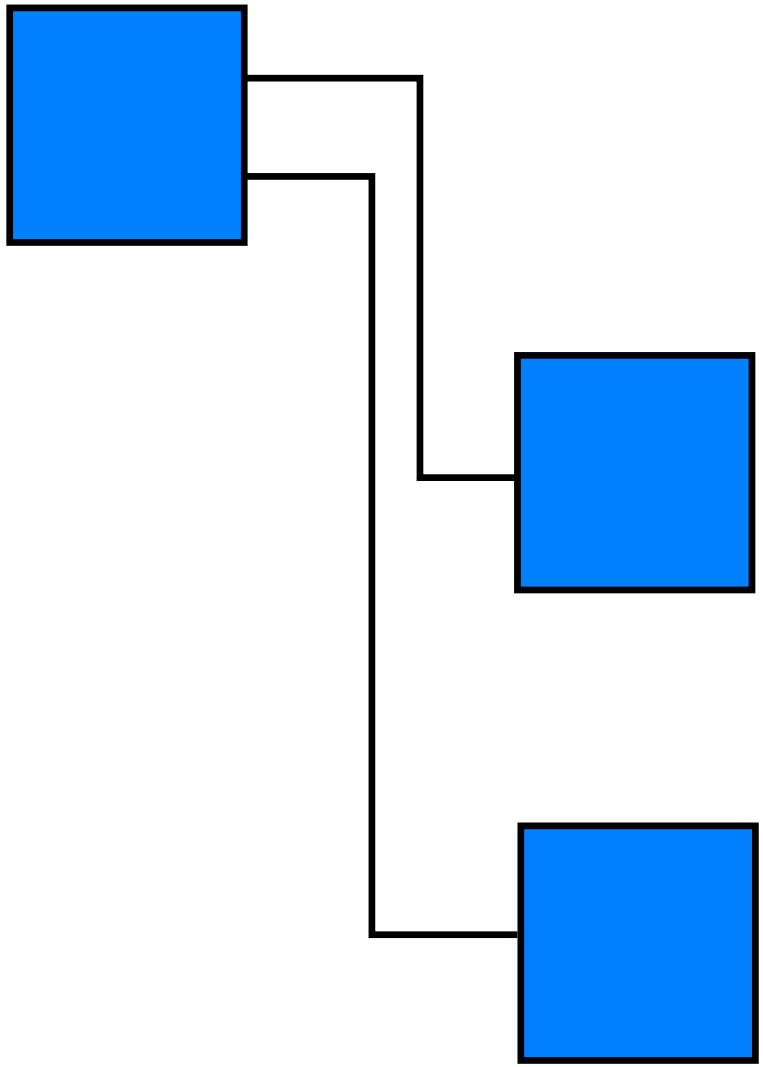
A data flow diagram arranged with KLay Layered.

Node Placement



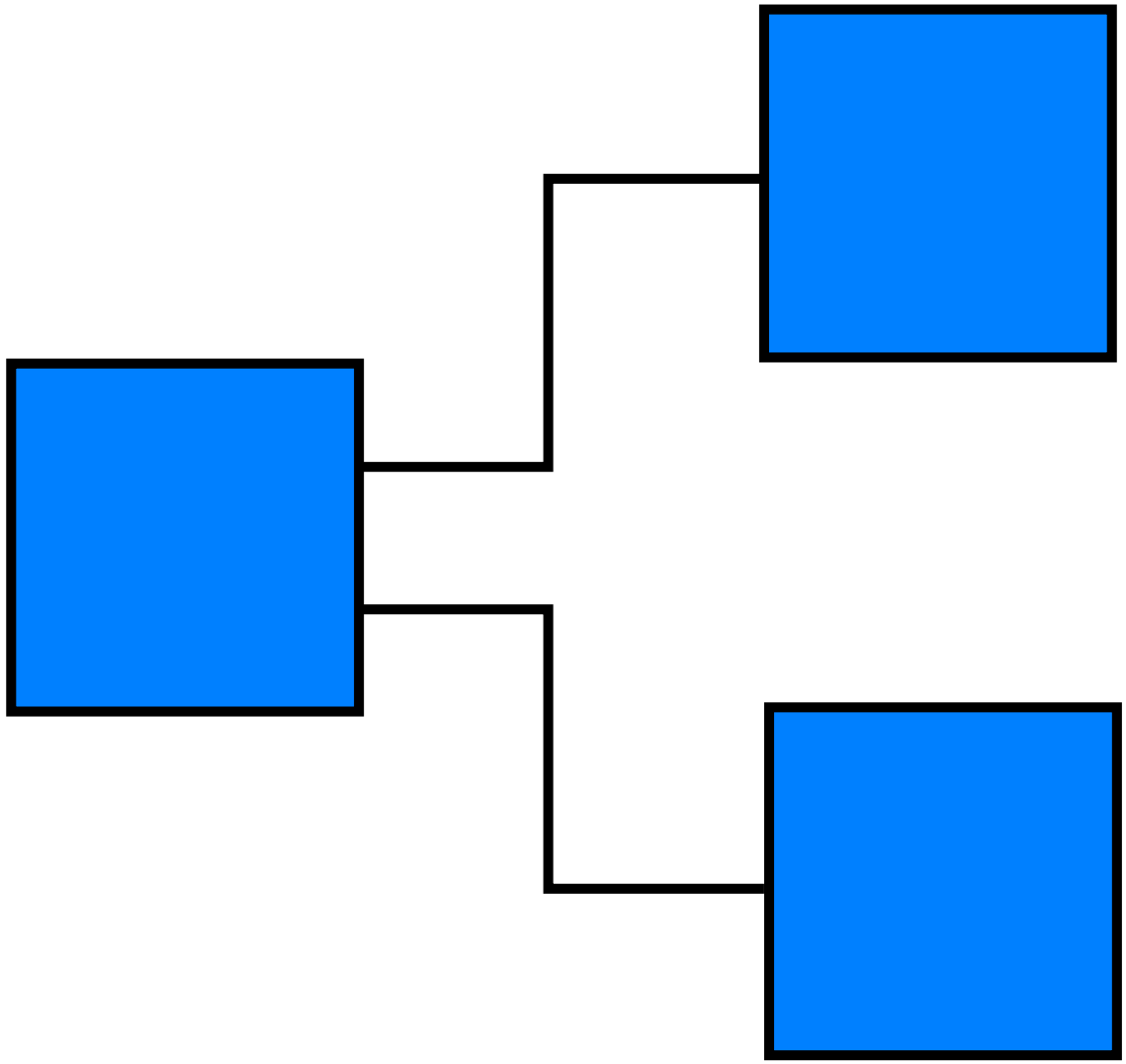
The Architecture of KLay Layered [Carstens, 2012].

Node Placement — A Bad Example



Bad choice for vertical coordinates [Carstens, 2012].

Node Placement — A Better Example



Better choice for vertical coordinates [Carstens, 2012].

Defining Node Placement

Vertical Coordinates

Node Placement is the process of assigning every node on a layer vertical coordinates.

Defining Node Placement

Vertical Coordinates

Node Placement is the process of assigning every node on a layer vertical coordinates.

Aesthetics Criteria

These coordinates should be assigned respecting aesthetics criteria.

Aesthetics Criteria

- Edge bends

Aesthetics Criteria

- Edge bends
- Edge crossings

Aesthetics Criteria

- Edge bends
- Edge crossings
- Balanced layout

Outline

References

Georg Sander (1996)

A fast heuristic for hierarchical Manhattan layout.

In Graph Drawing, volume 1027 of Lecture Notes in Computer Science, pages 447458. Springer Berlin / Heidelberg, 1996.

John Julian Carstens (2012)

Node and label placement in a layered layout algorithm.

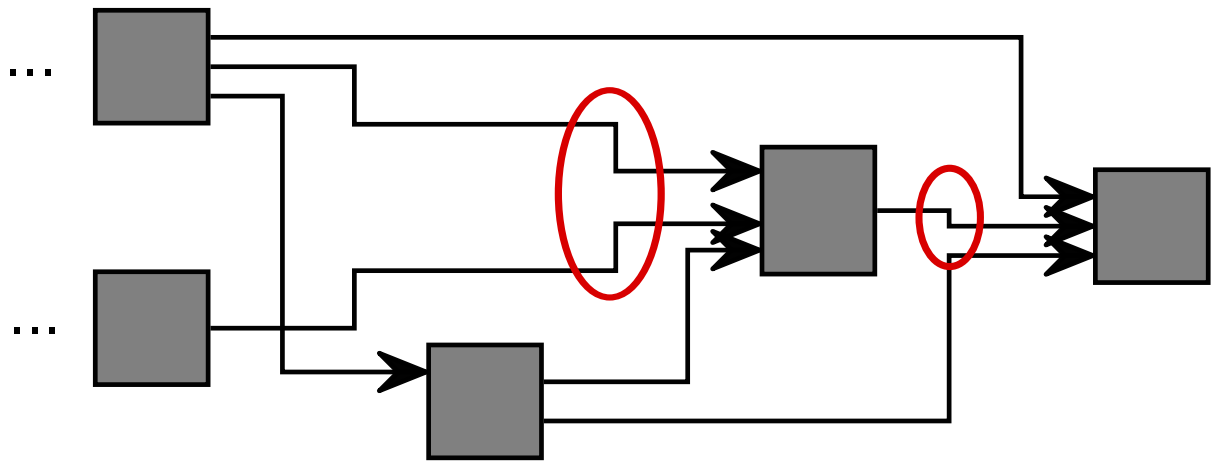
Masters thesis, Christian-Albrechts-Universitt zu Kiel, Department of Computer Science.

Katja Petrat (2014)

Erweiterung und Implementierung eines Knotenplatzierungsalgorithmus.

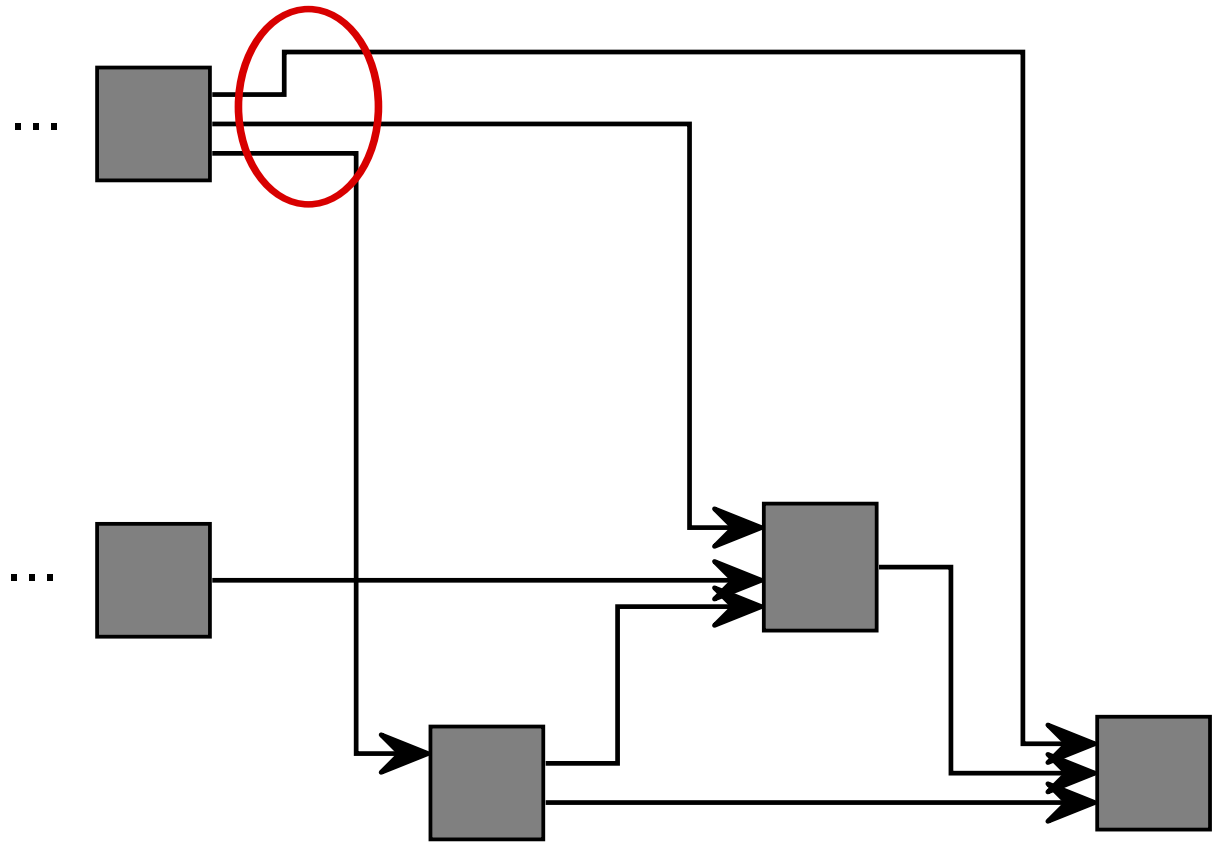
Bachelor thesis, Christian-Albrechts-Universitt zu Kiel, Department of Computer Science.

Linear Segments Node Placer



Linear Segments Node Placer [Petrat, 2014].

BK Node Placer

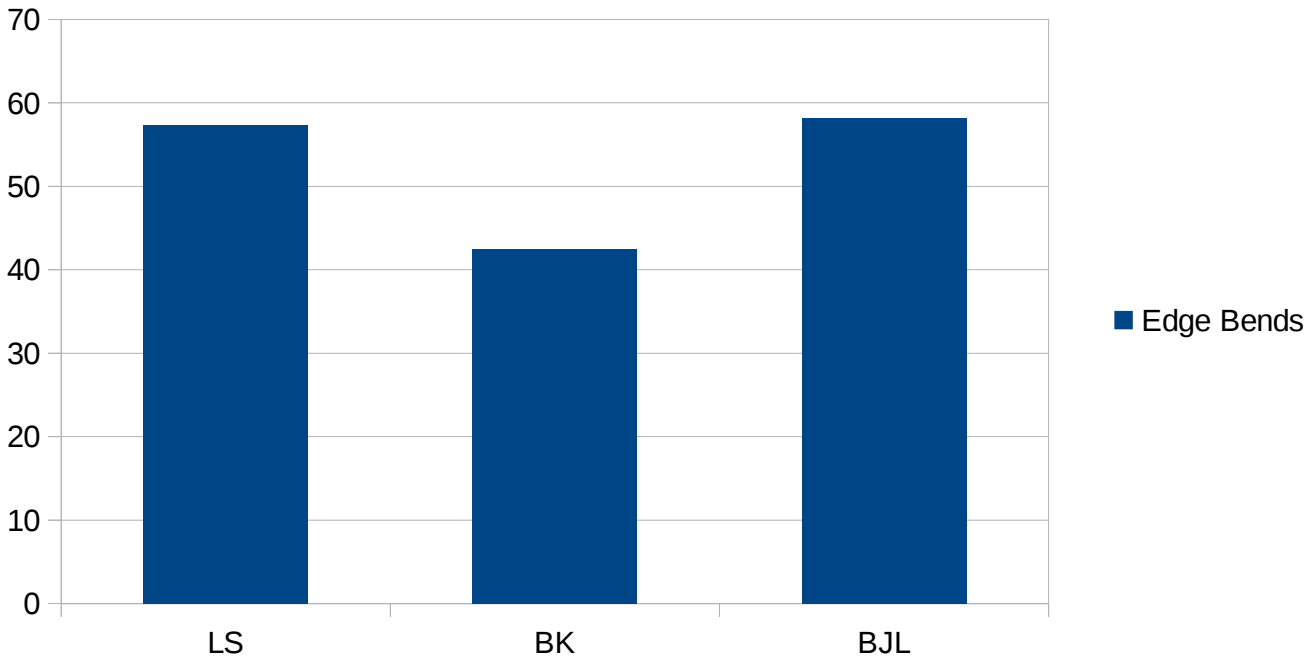


BK Node Placer [Petrat, 2014].

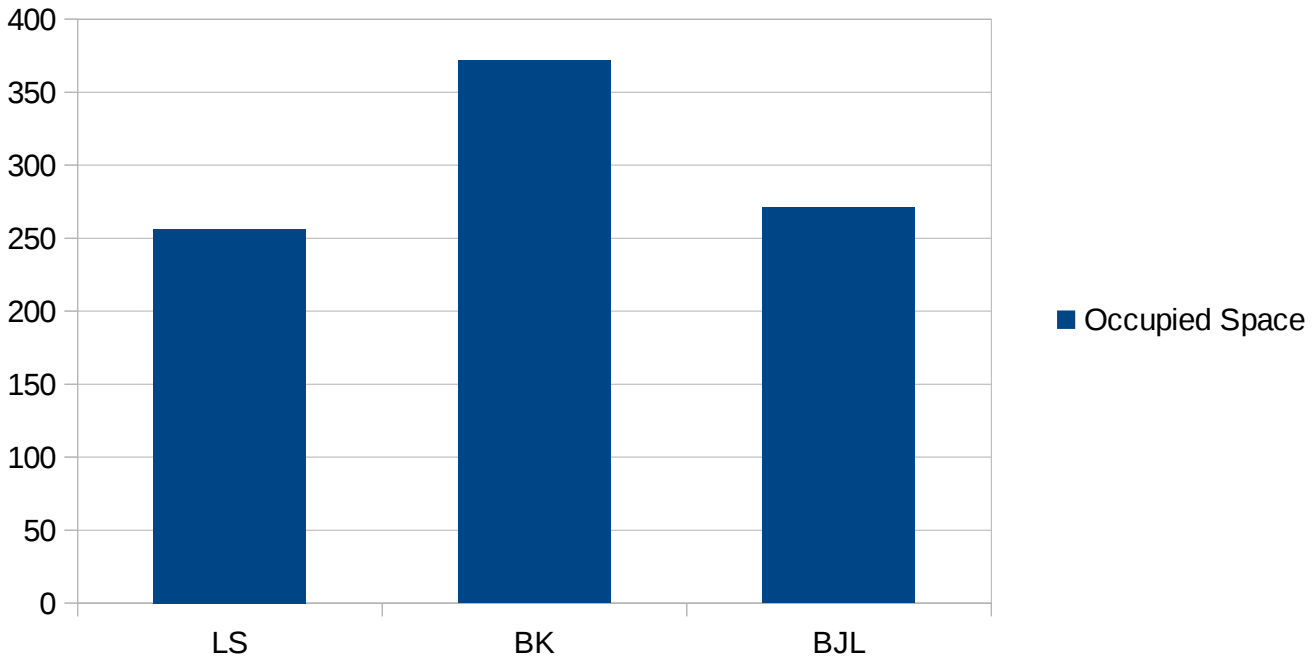
BJL Node Placer

No significant difference to layout generated by Linear Segments Node Placer.

Evaluation



Evaluation



Evaluation

Conclusion 1

Concentrate on improvement of BK Node Placer.

Evaluation

Conclusion 1

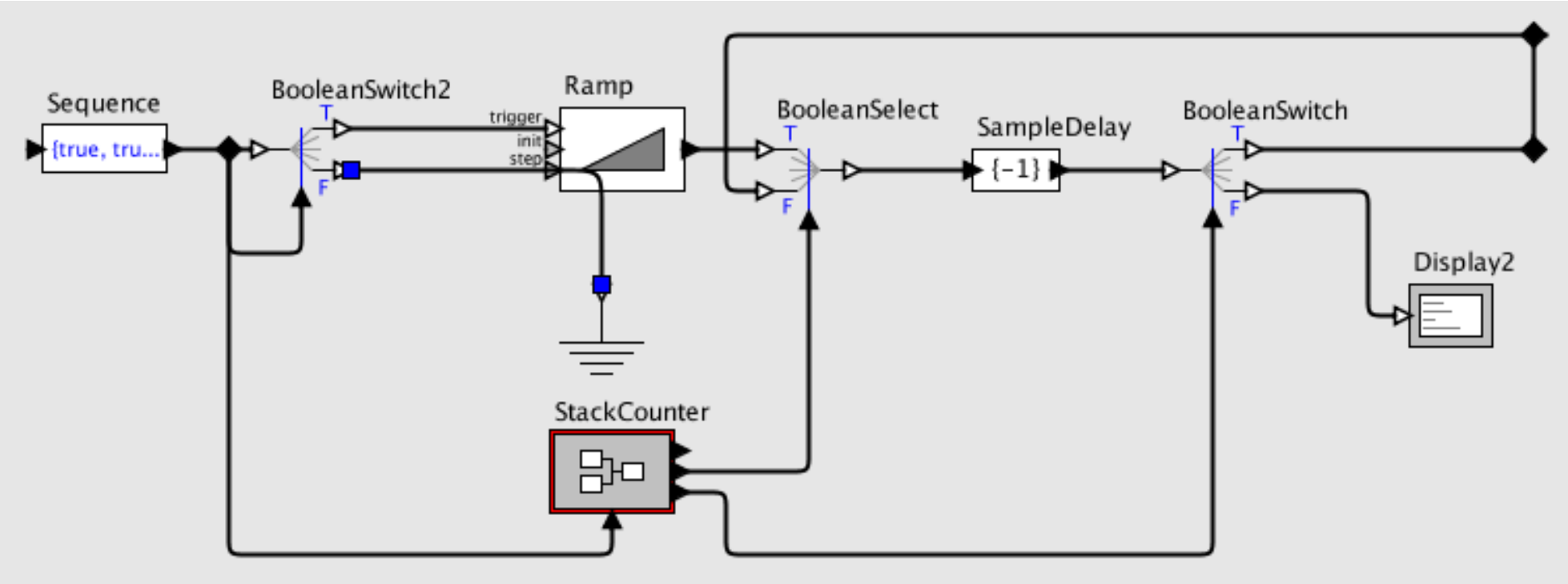
Concentrate on improvement of BK Node Placer.

Conclusion 2

Concentrate on implementing a new algorithm inspired by the BK Node Placer.

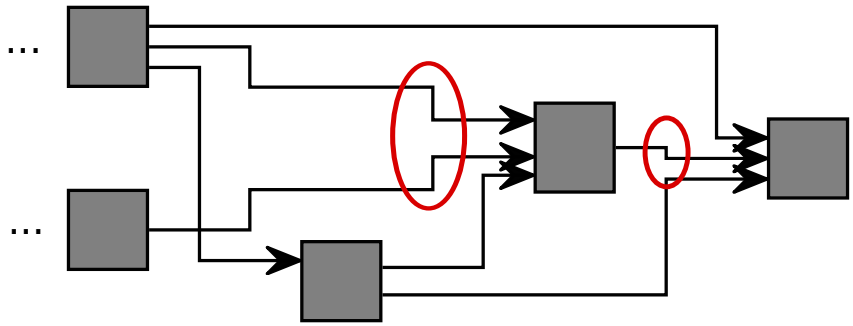
Outline

Problem 1

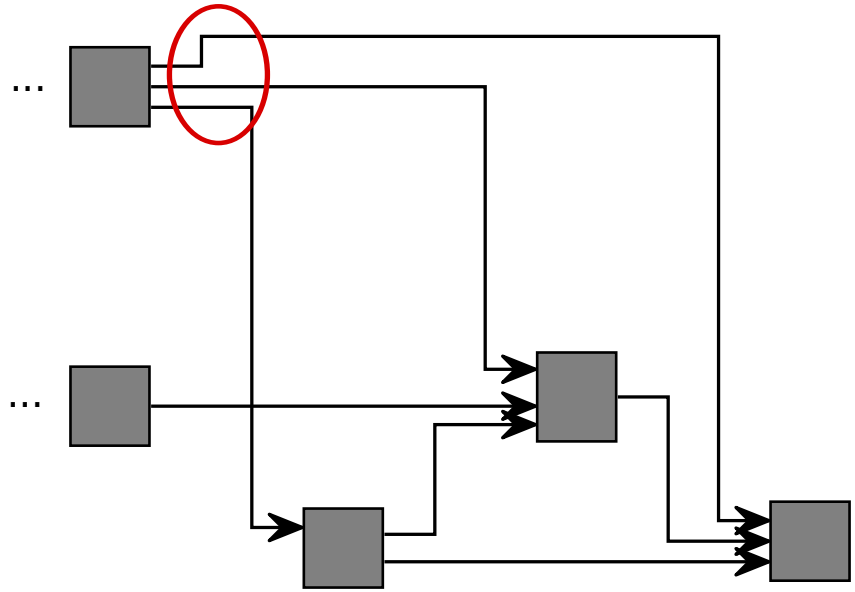


Annoying problem.

Problem 2



(a) *Linear Segments Node Placer*

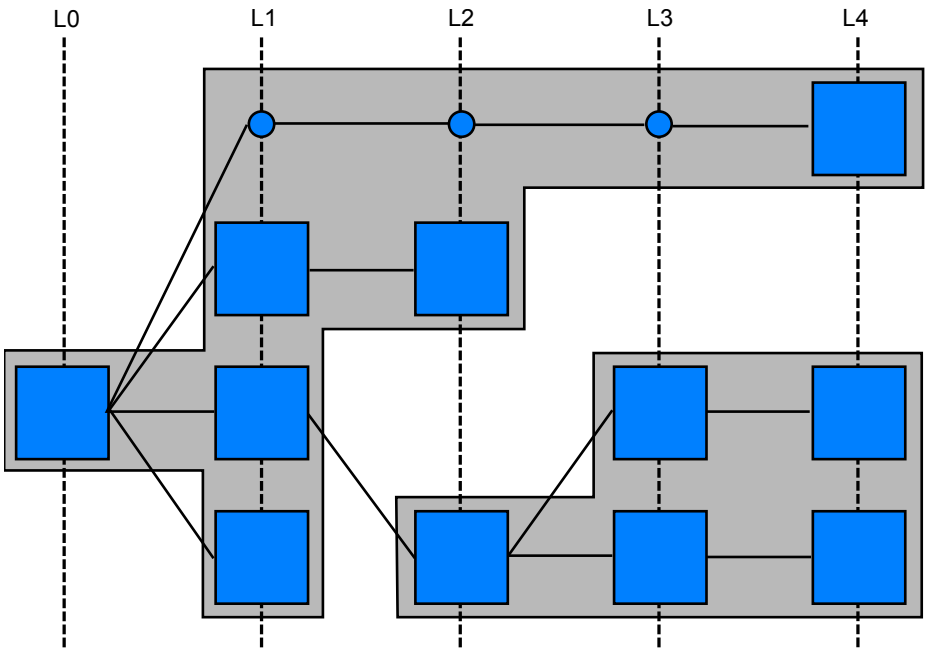


(b) *BK Node Placer*

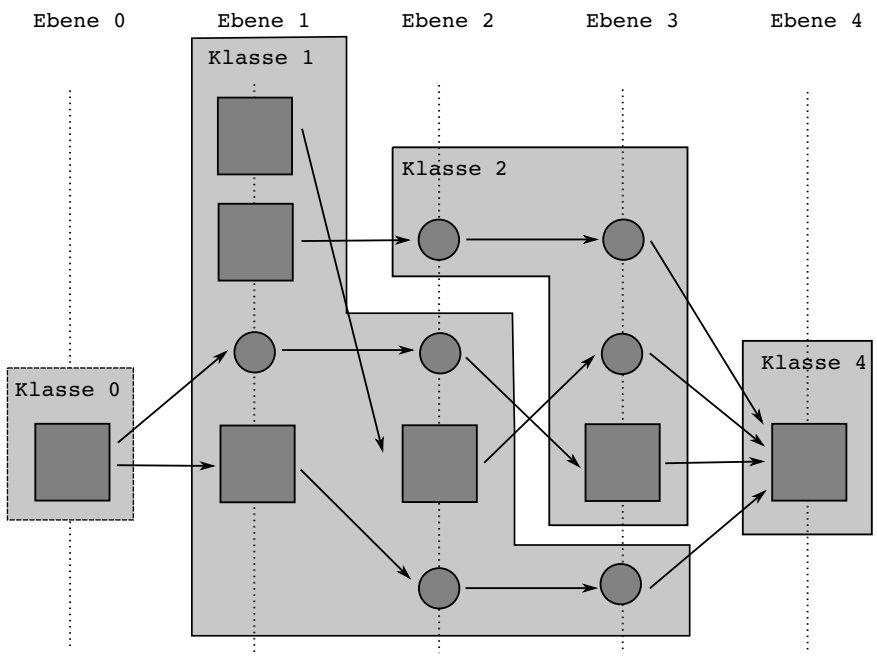
Ideas for Improvement

- Implement different block alignment

Current Alignment



(c) *BK Node Placer*



(d) *BJL Node Placer*

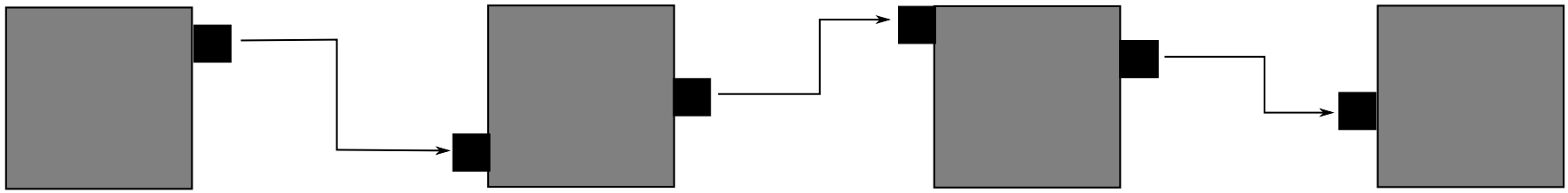
Ideas for Improvement

- Implement different block alignment
- Allow edge bends for a more compact layout

Ideas for Improvement

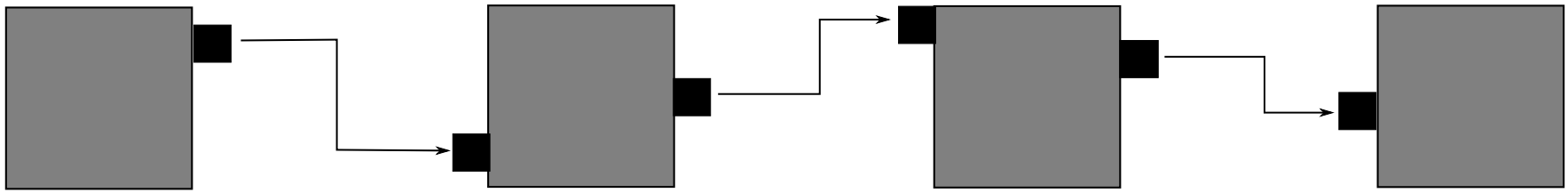
- Implement different block alignment
- Allow edge bends for a more compact layout
- Floating ports support

The Problem with Ports

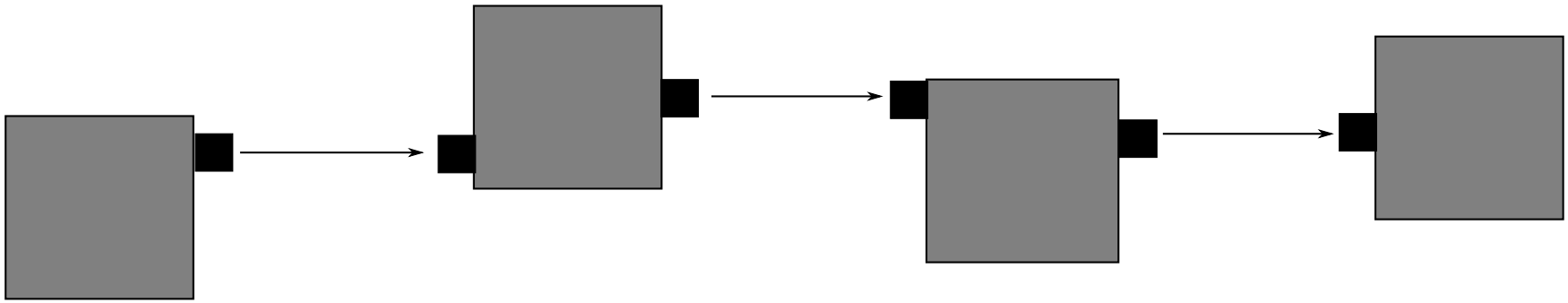


How to reduce edge bends? [Petrat, 2014]

The Problem with Ports



How to reduce edge bends? [Petrat, 2014]



Problem solved? [Petrat, 2014]

Ideas for Improvement

- Implement different block alignment
- Allow edge bends for a more compact layout
- Floating ports support