



# An Improved Fisheye Zoom Algorithm for Visualizing and Editing Hierarchical Models

**Tobias Reinhard**, Silvio Meier, Martin Glinz



REV'07, October 15, New Delhi

 University of Zurich 

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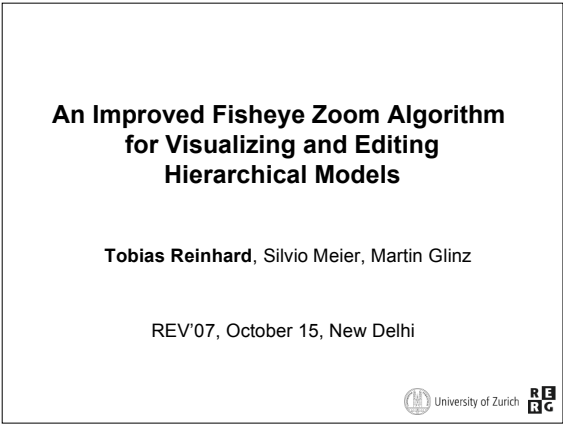
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# Outline

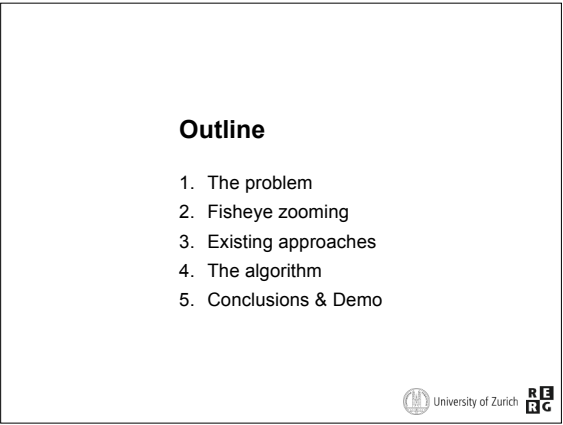
1. The problem
2. Fisheye zooming
3. Existing approaches
4. The algorithm
5. Conclusions & Demo

The logo of the University of Zurich, featuring a circular emblem with a building and text.

University of Zurich



REC



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- The logo of the University of Zurich, featuring a circular emblem with a building and text.
- University of Zurich
- REC

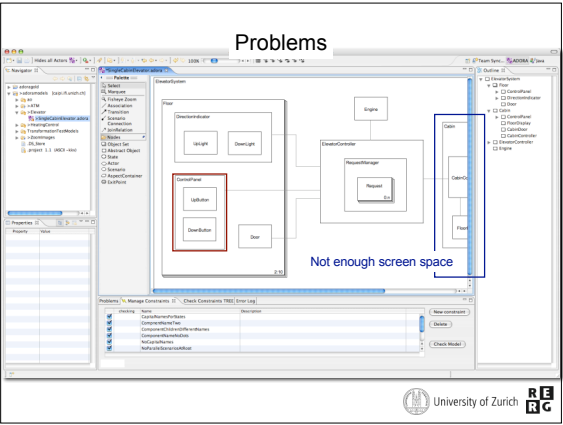
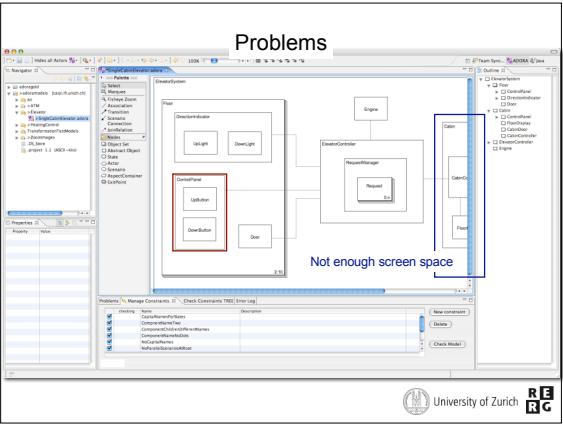
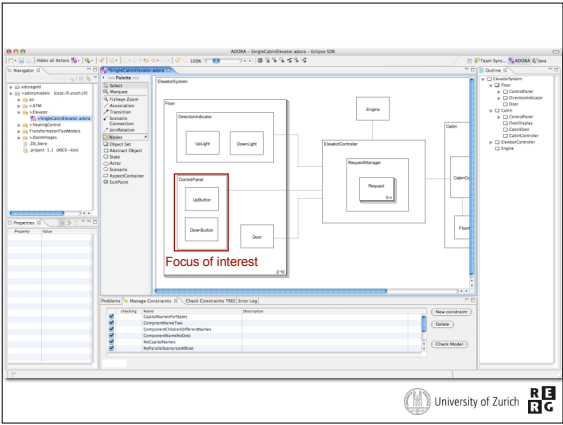
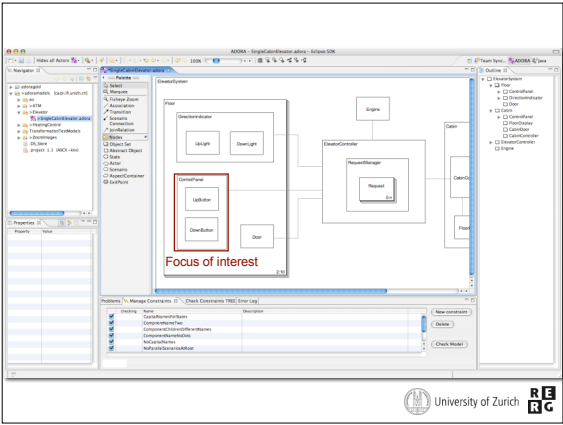
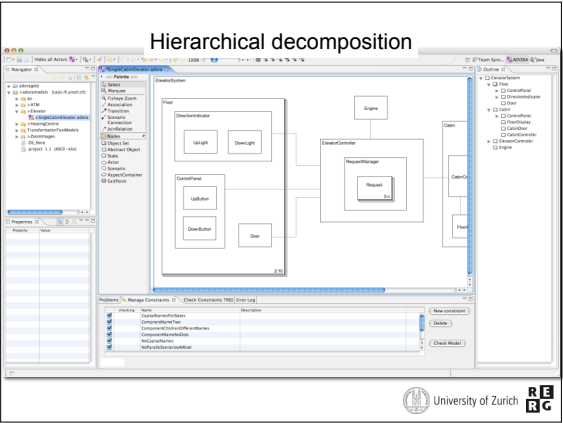
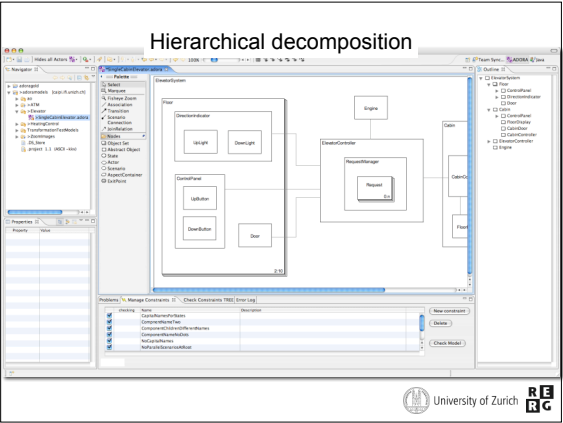
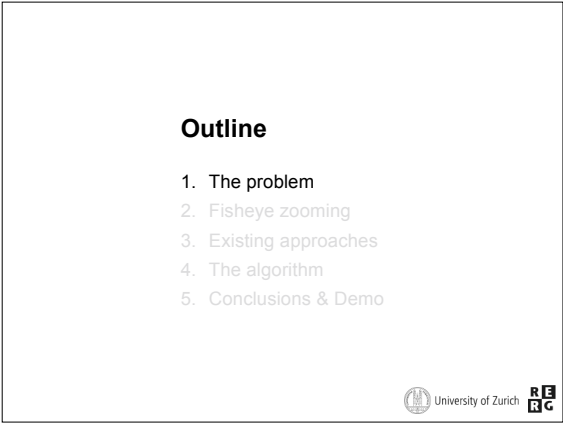


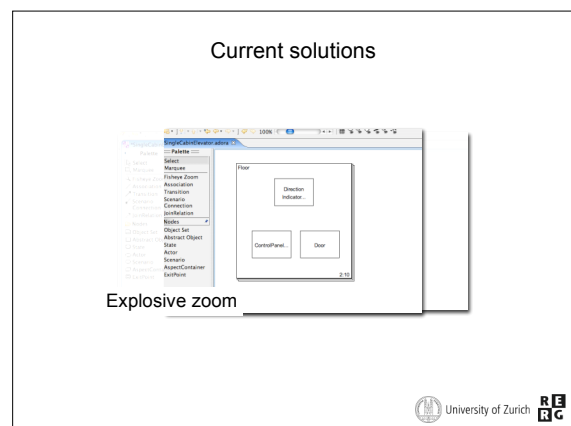
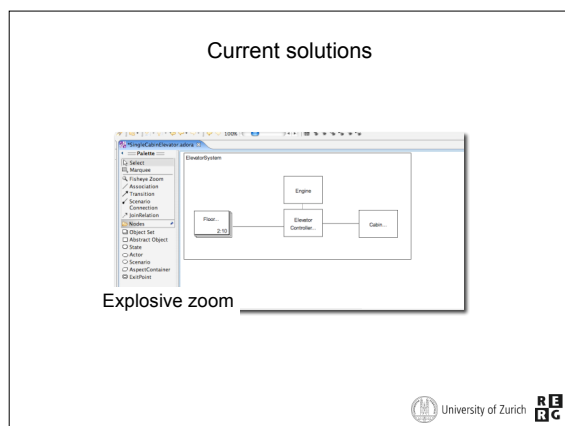
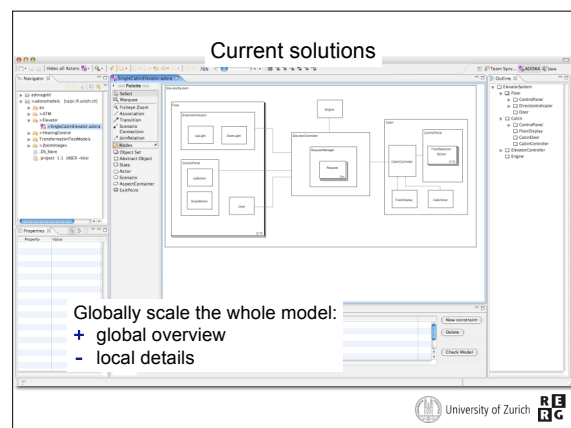
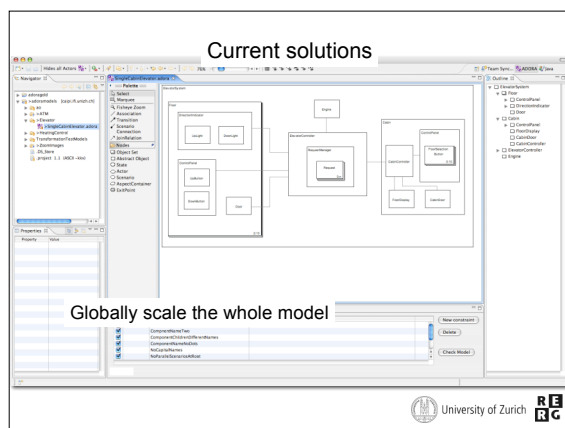
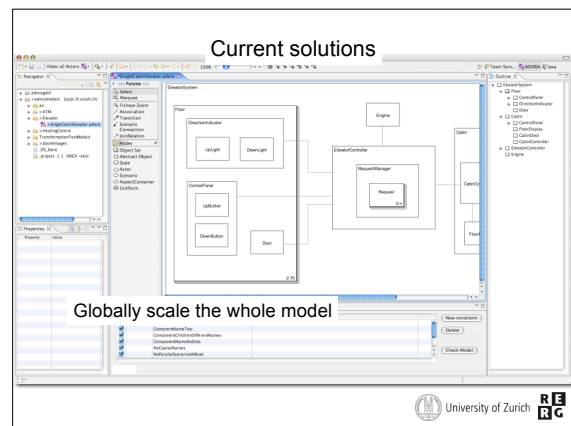
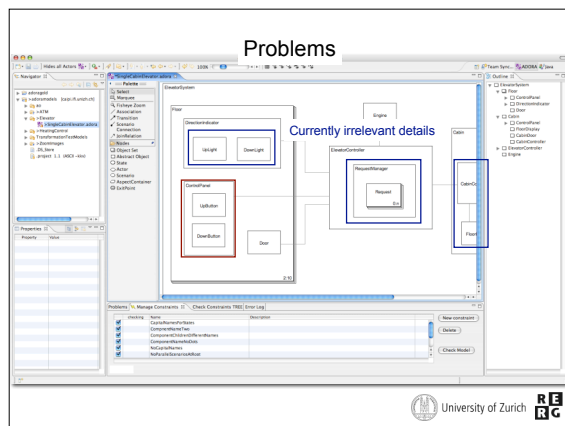
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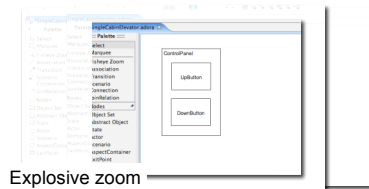
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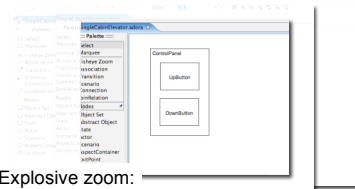


## Current solutions



Explosive zoom

## Current solutions



Explosive zoom:  
+ local detail  
- global context

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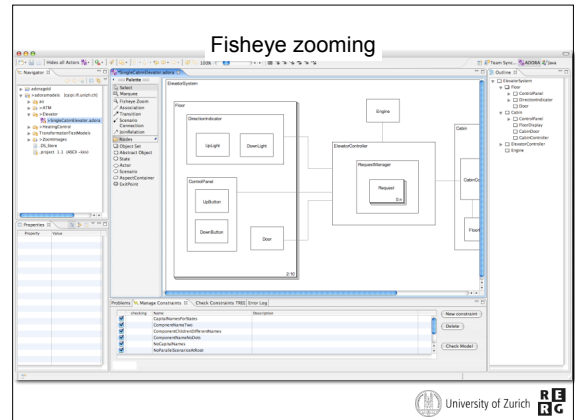


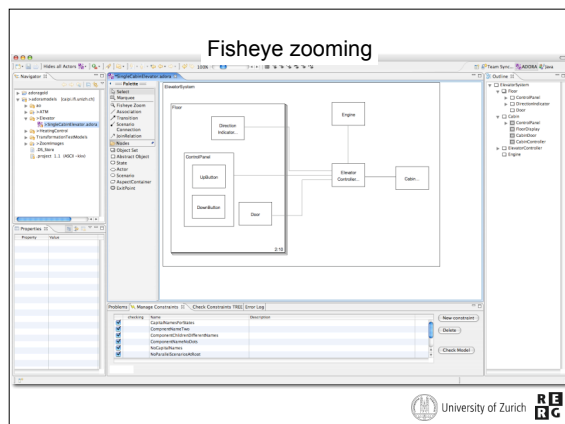
## Fisheye views

- magnify the objects in a focal point,
  - while reducing the size of objects farther away
- Local detail + global context



## Fisheye zooming





## Zoom algorithm

Produce a **new layout** (position and size of the nodes)  
if the size of a node changes because its inner  
structure is shown or hidden.

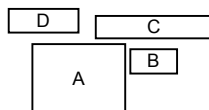
## Desired properties of a zoom algorithm

- no overlapping of nodes
- preserve the user's **mental map**
- **stability** of the layout
- permit **editing** operations
- no remarkable **delay**
- **multiple** focal points

## Outline

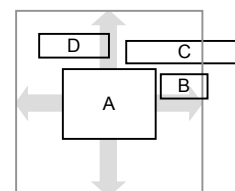
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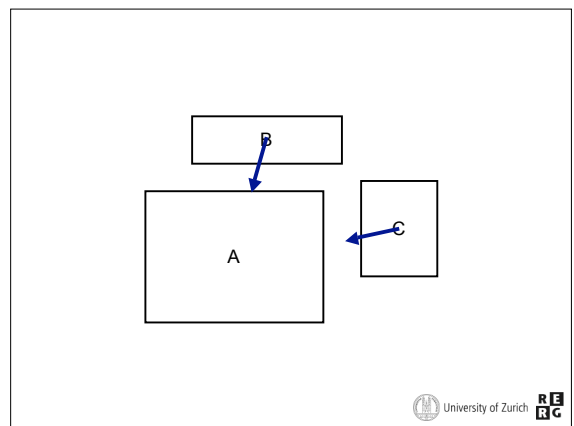
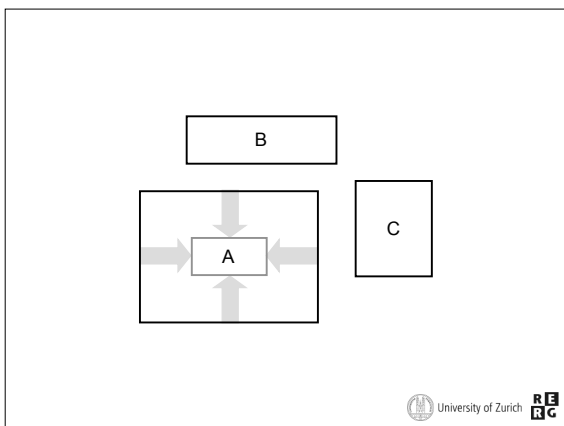
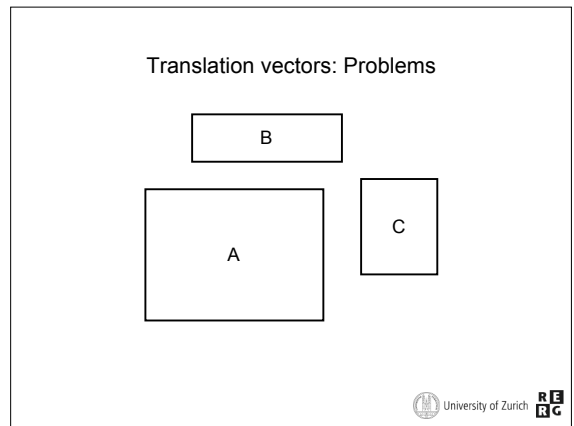
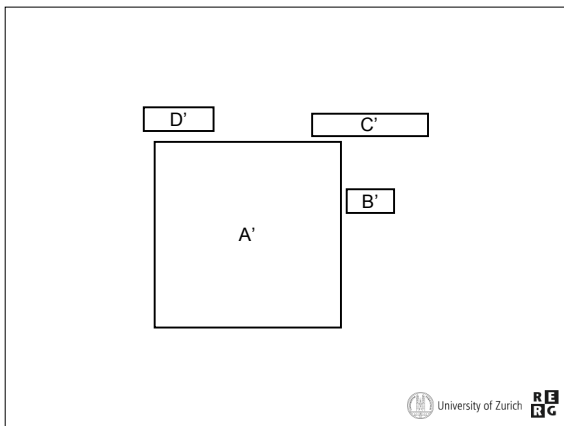
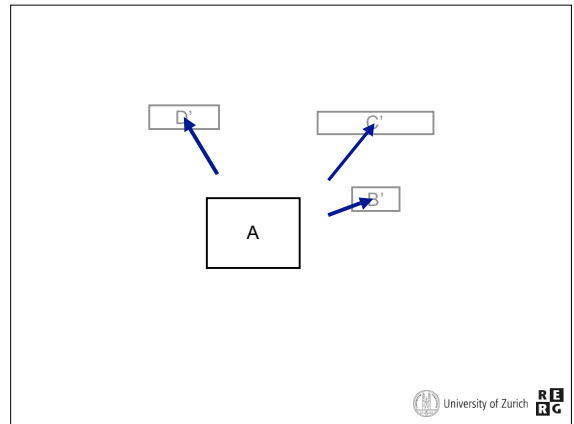
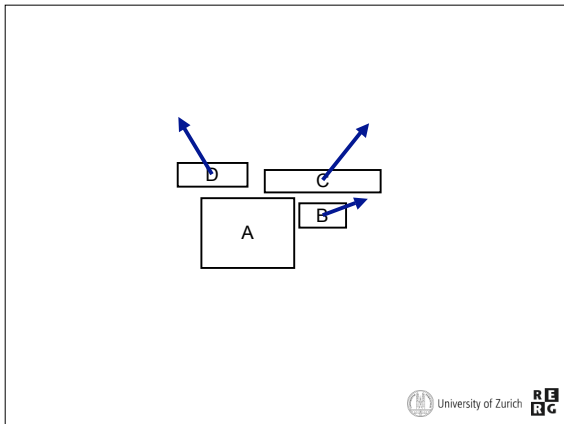
## Existing approaches: Translation vectors

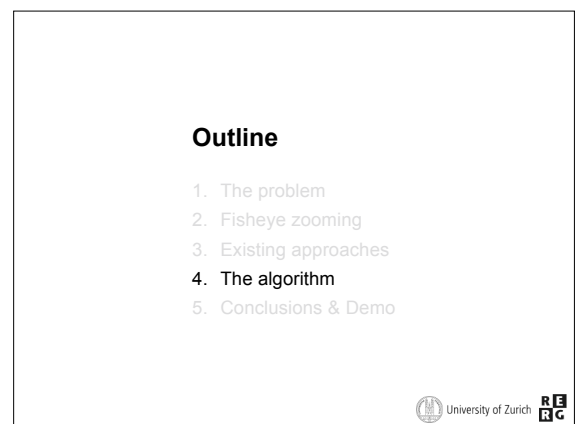
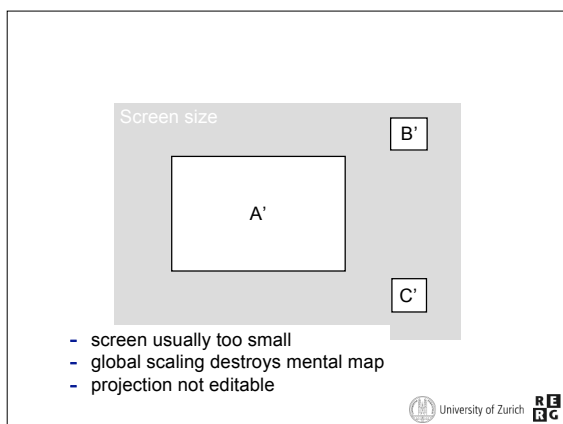
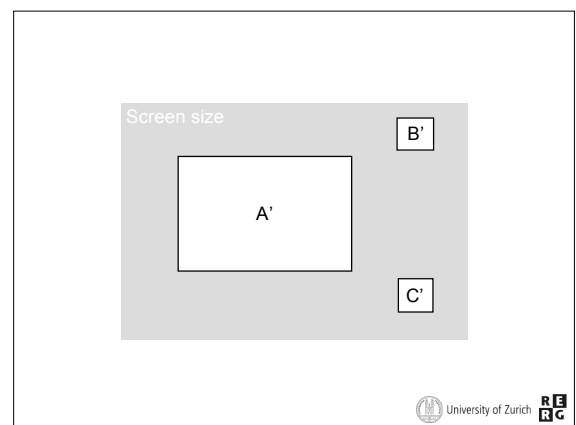
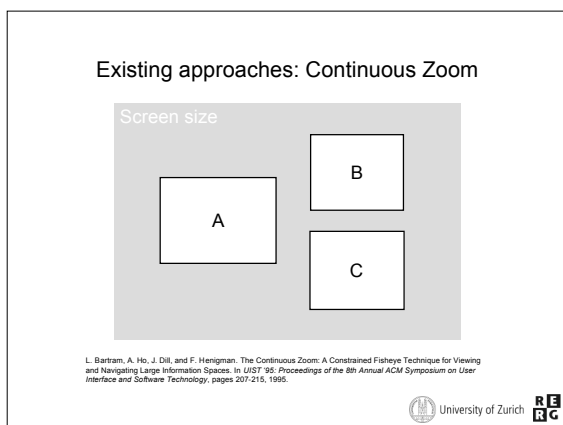
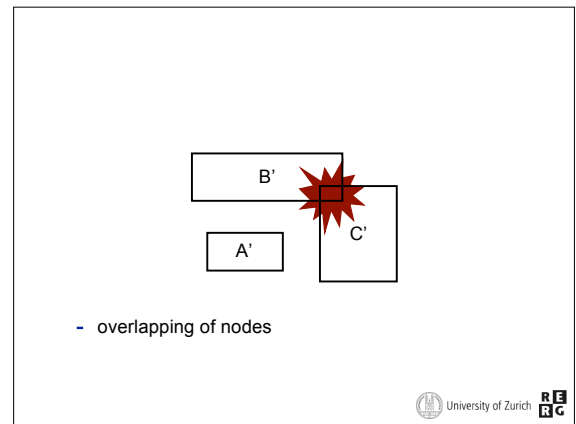
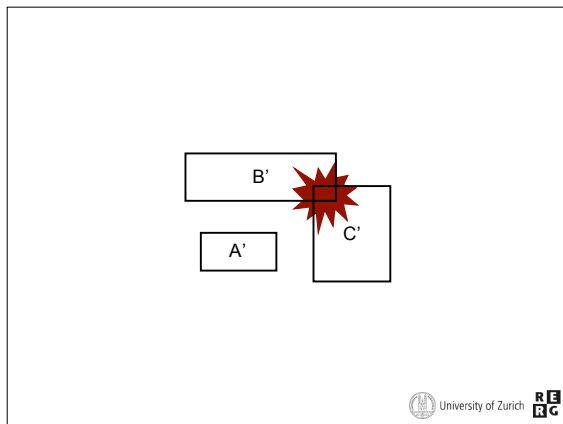


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S. Bemer, S. Joos, M. Glitz, and M. Arnold. A Visualization Concept for Hierarchical Object Models. In Proceedings of the 13th IEEE International Conference on Automated Software Engineering (ASE-98), pages 225-228, 1998.

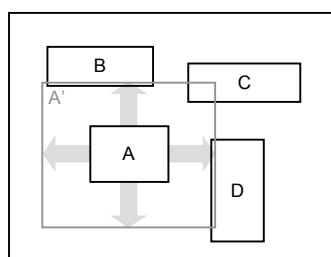
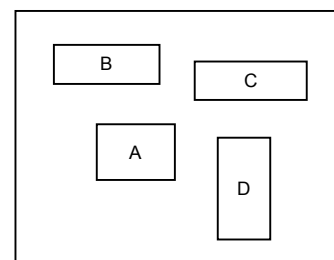
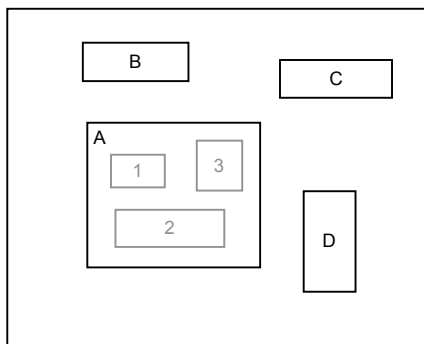
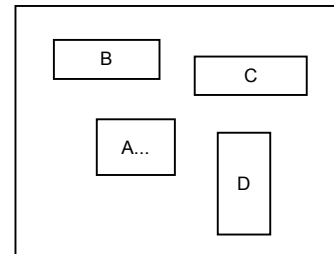




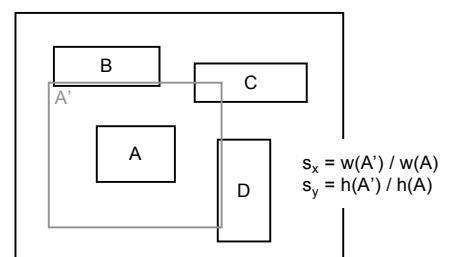


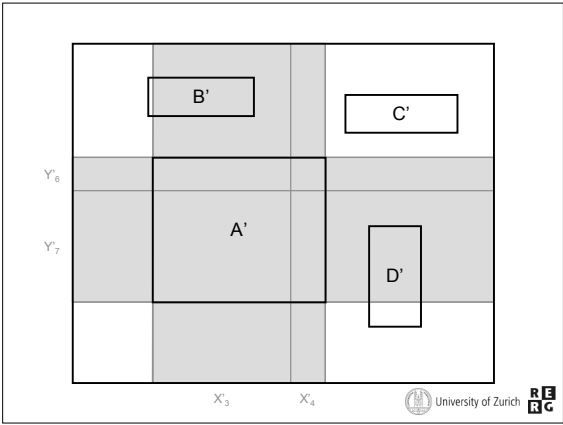
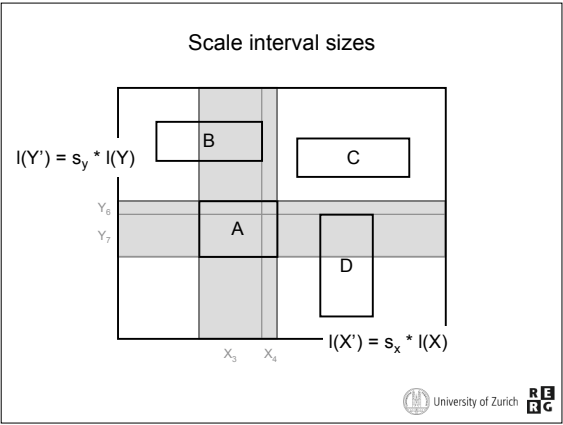
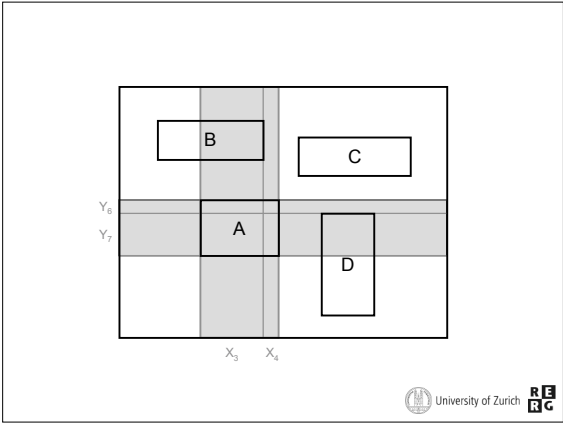
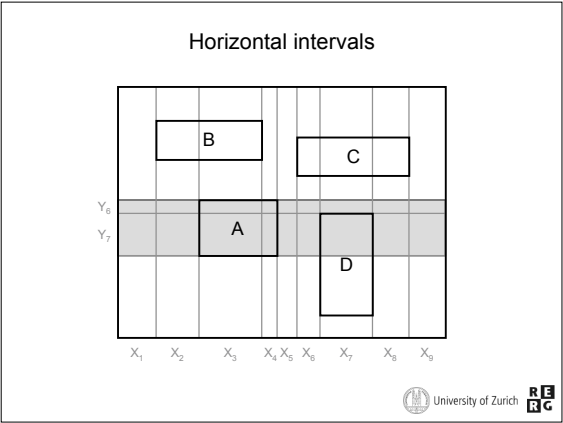
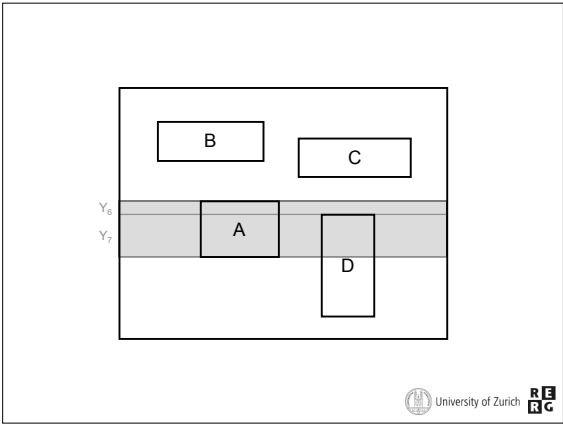
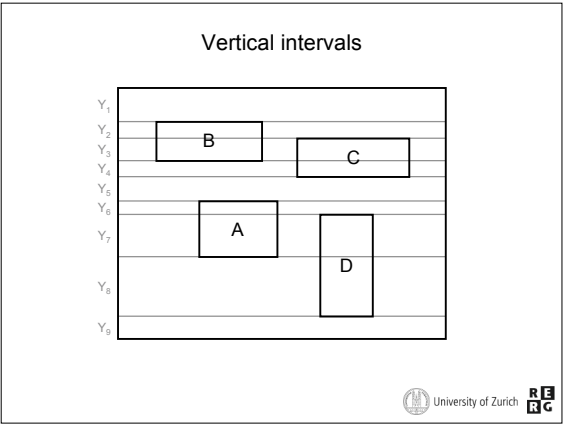
## Zooming-In

Increase the level of detail in a focal point.

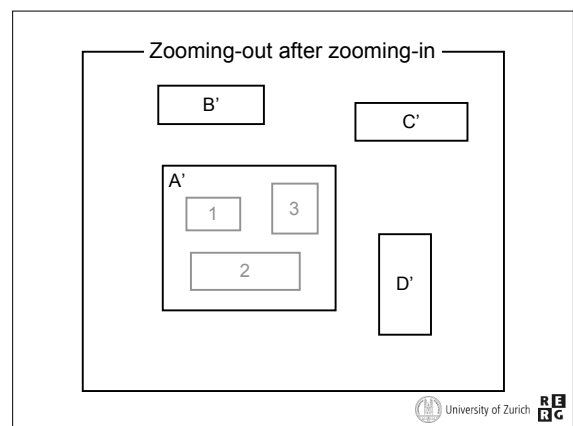
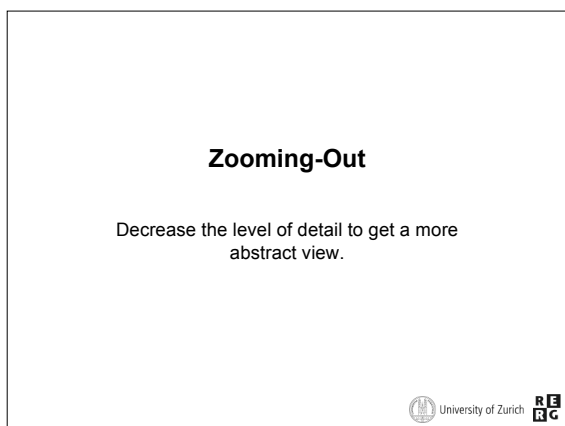
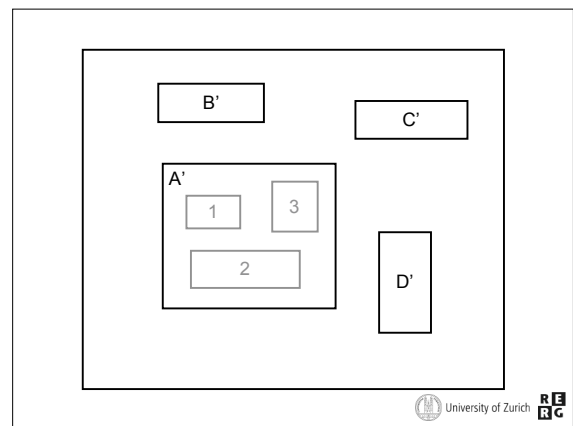
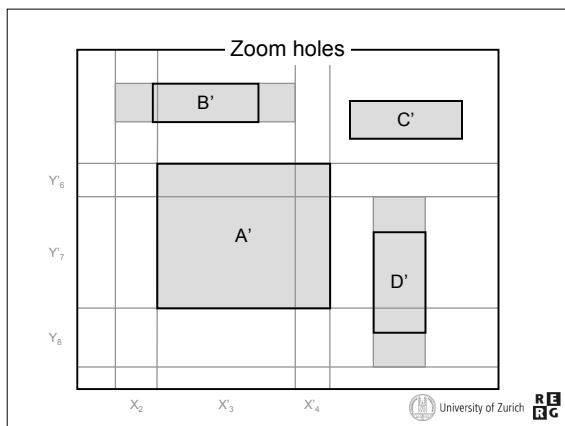
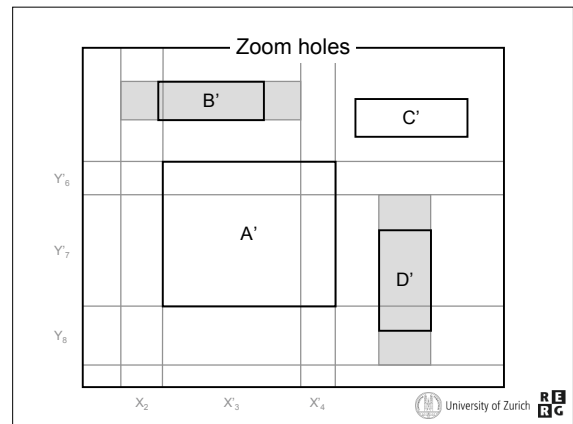
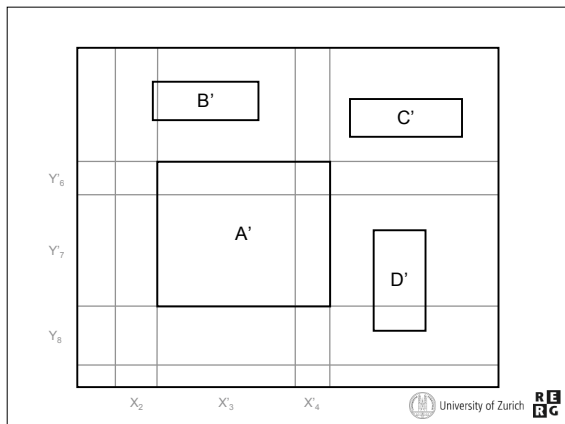


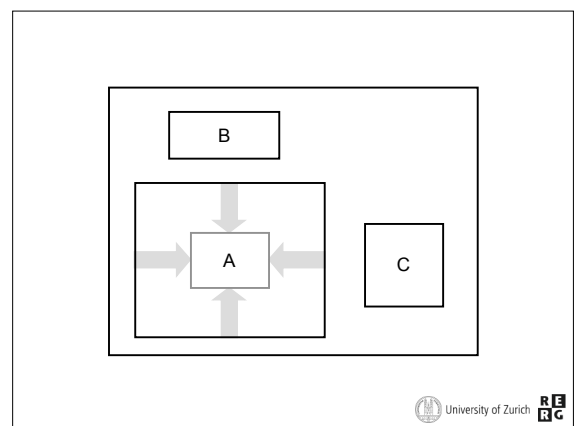
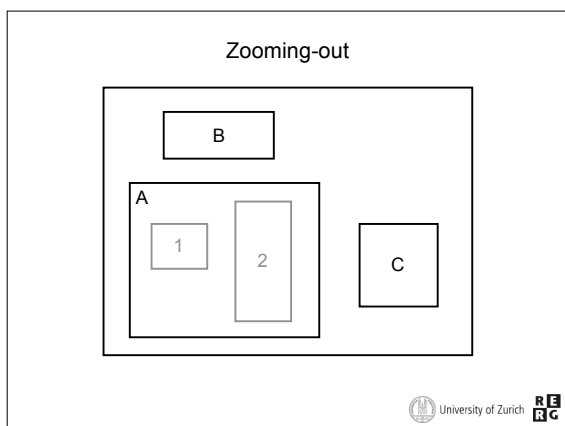
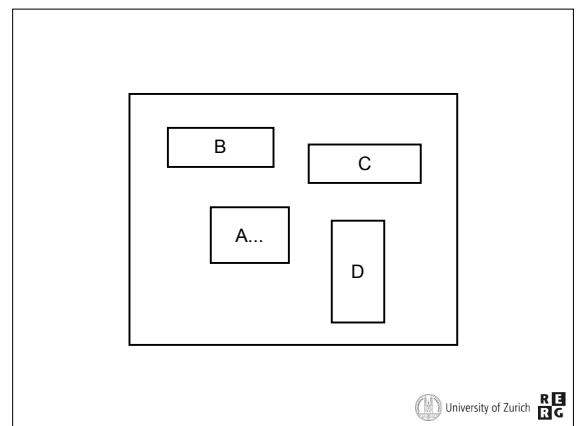
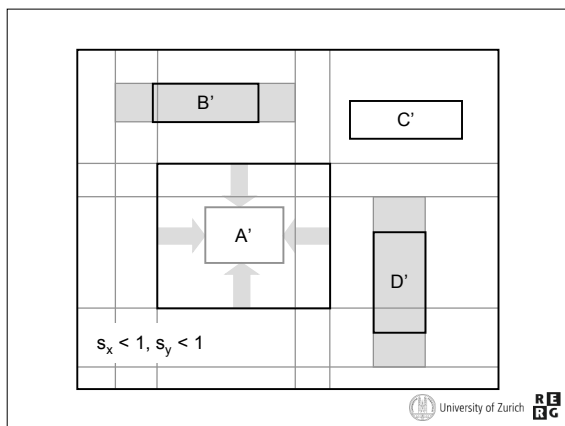
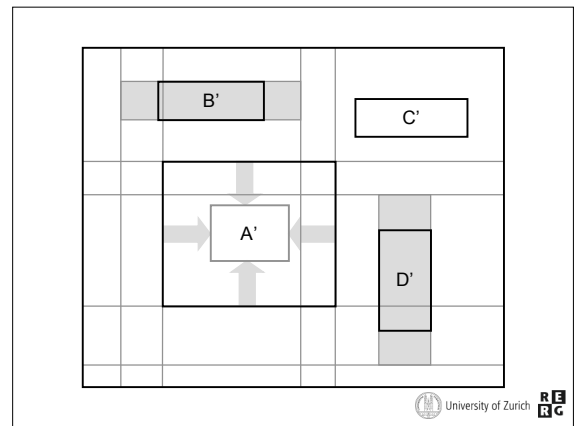
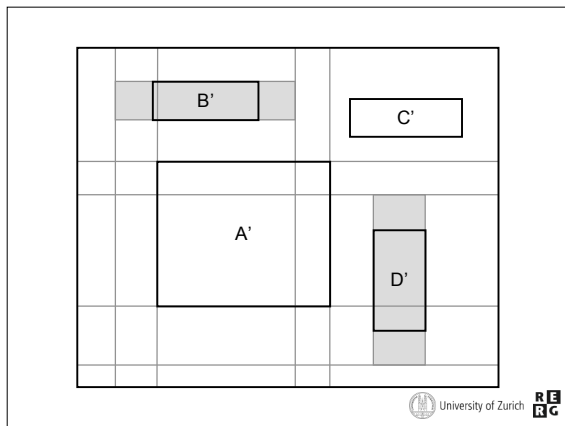
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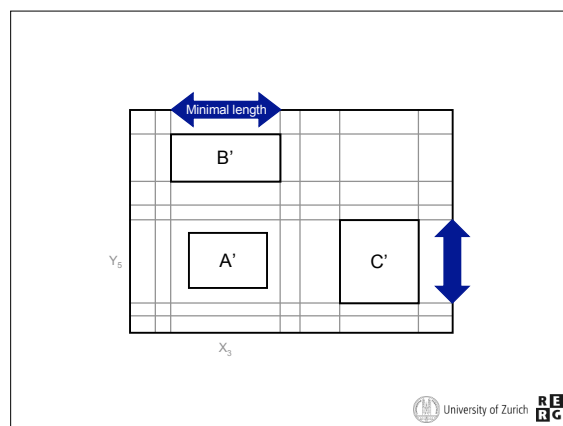
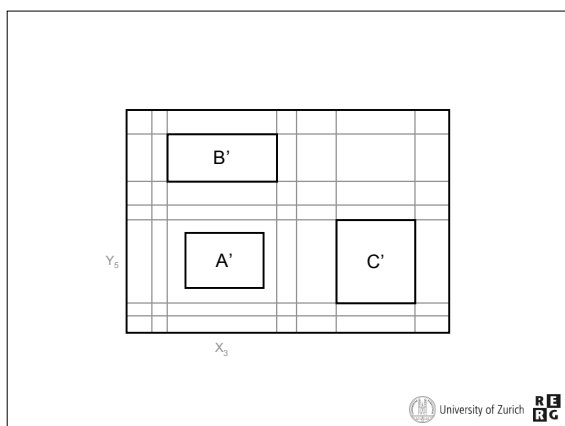
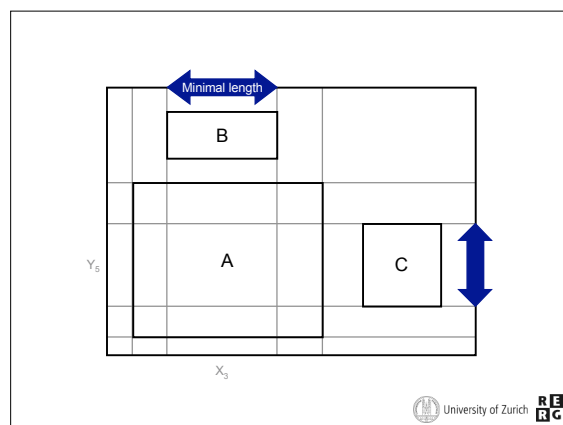
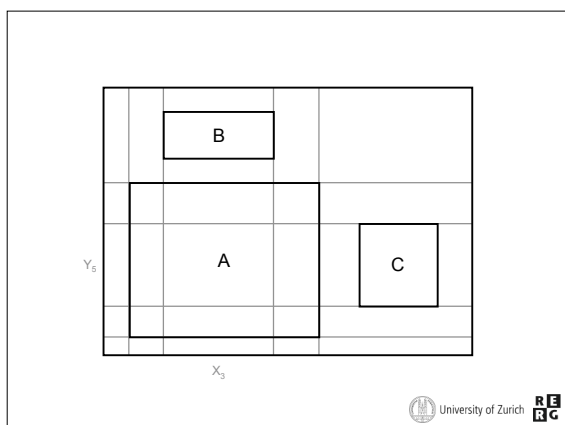
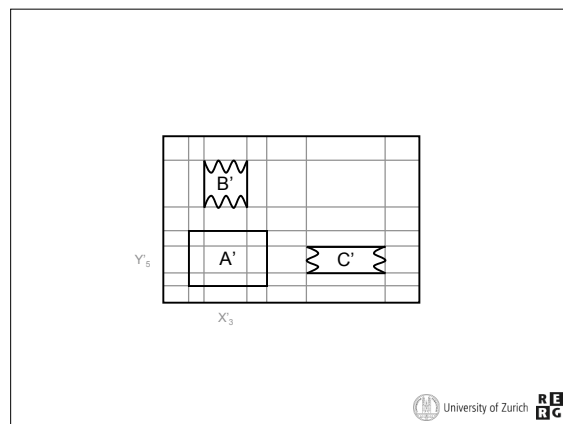
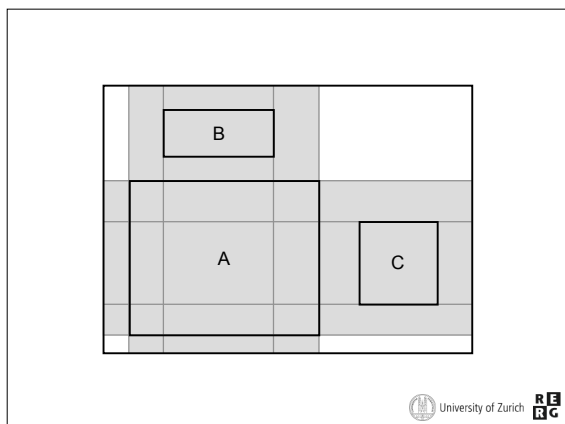


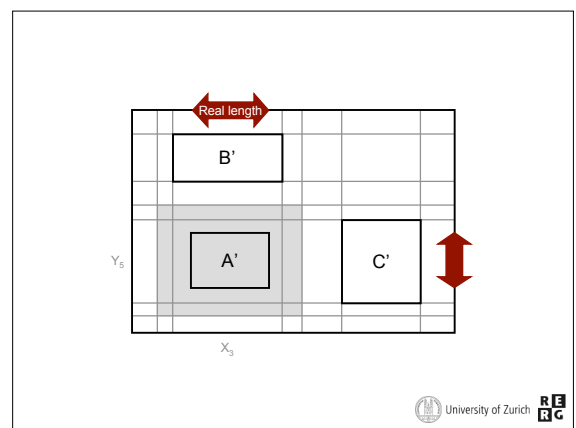
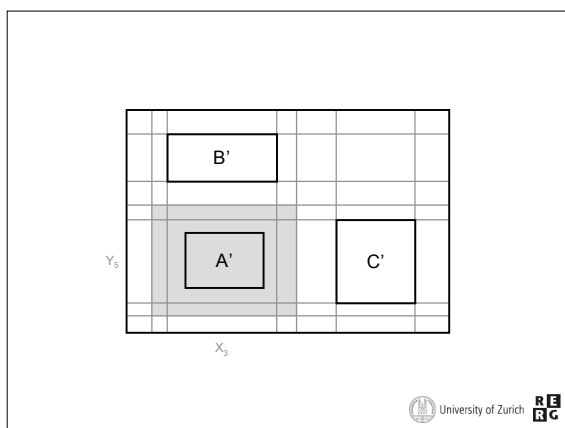
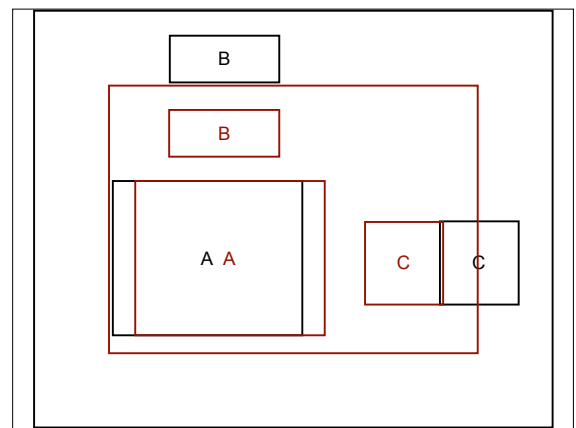
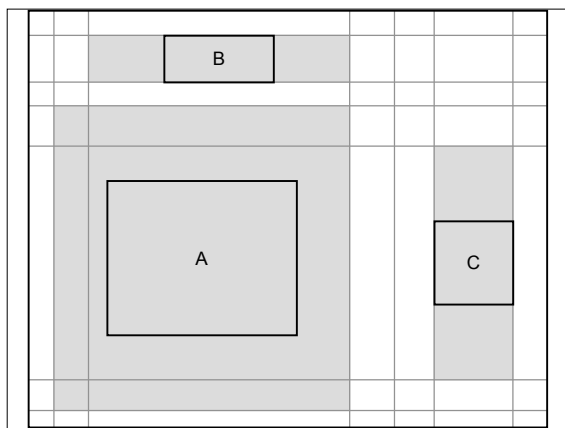
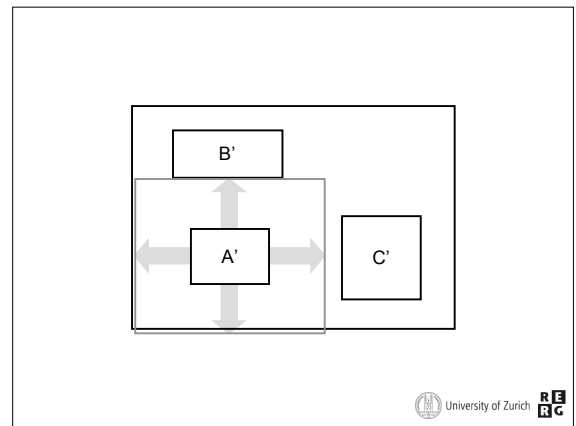
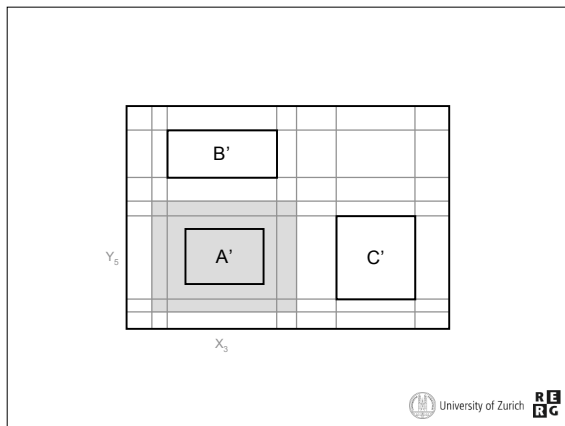


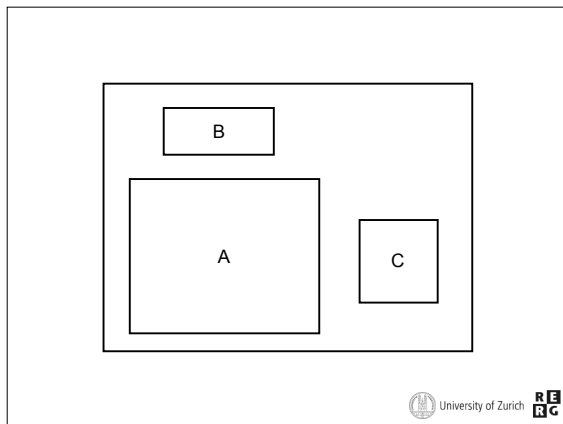






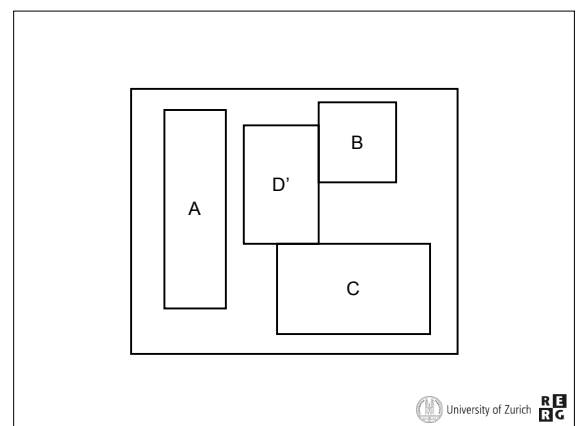
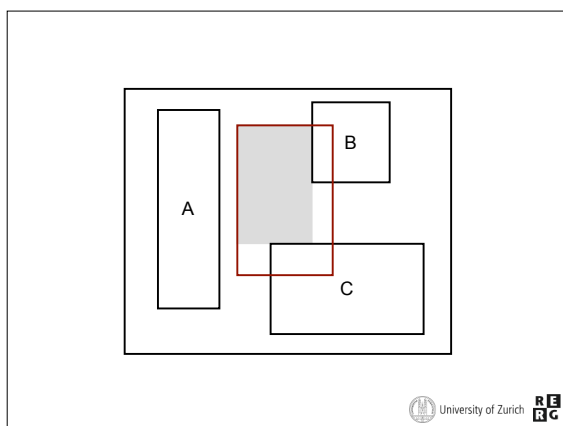
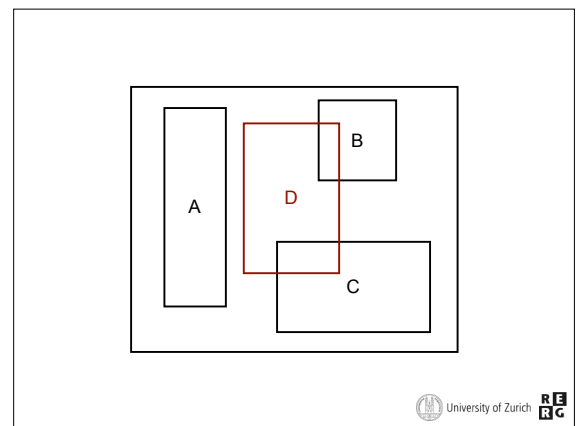
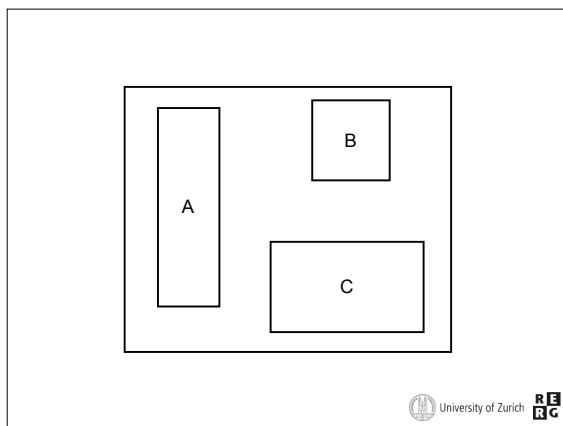


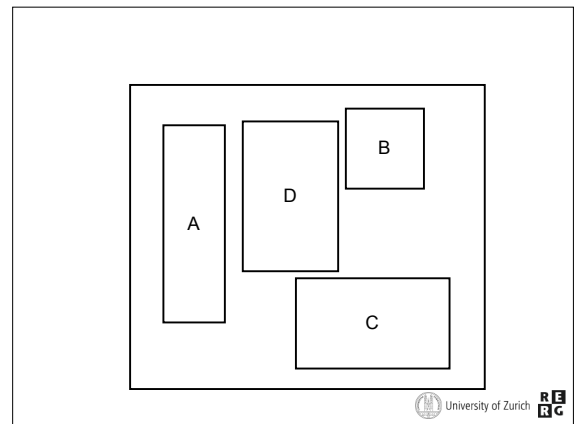
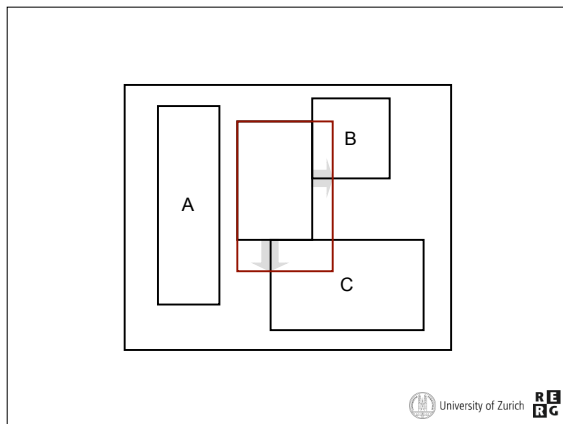




## Editing Hierarchical Models

Use the zoom algorithm to [adapt the layout](#) when a node is inserted or deleted.





### Additional editing operations

- remove node
- move node
- resize node

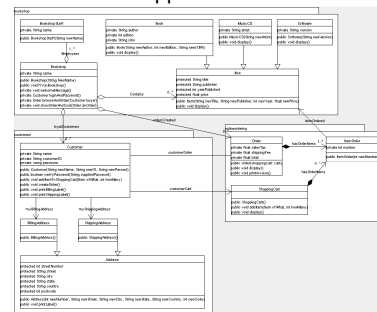
### Outline

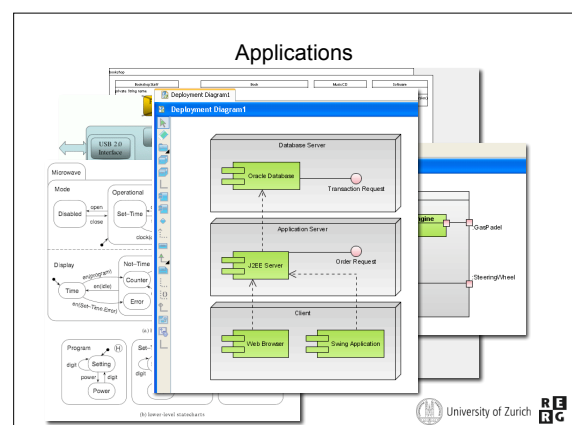
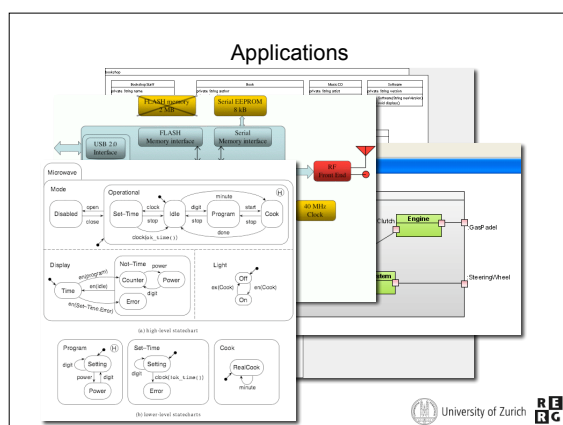
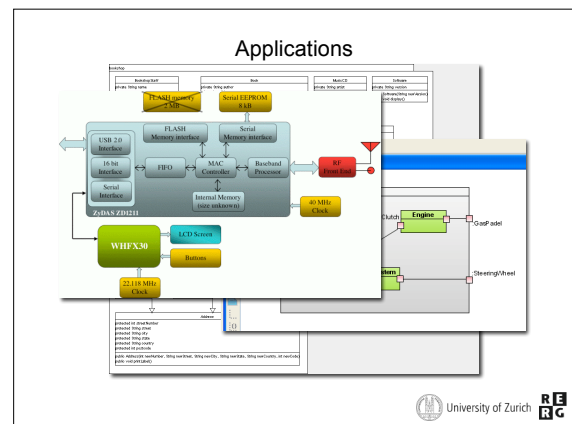
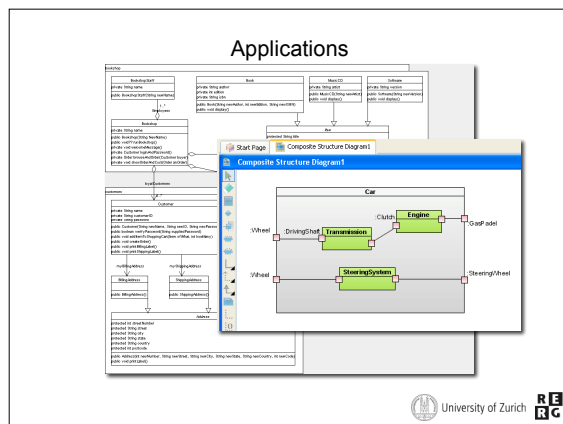
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### Desired properties of a zoom algorithm

- no node **overlaps** → scaling non-overlapping intervals
- preserve the user's **mental map** → order of intervals
- **stability** of the layout → real length, scaling
- permit **editing** operations → support editing
- no remarkable **delay** → linear number of intervals
- **multiple** focal points → zoom multiple nodes

### Applications





## Limitations / Future work

- screen still too small: combine with scrolling, scaling
- connections between nodes
- connection labels
- filtering (specific) nodes
- visualization of model transformations

