Software Visualization

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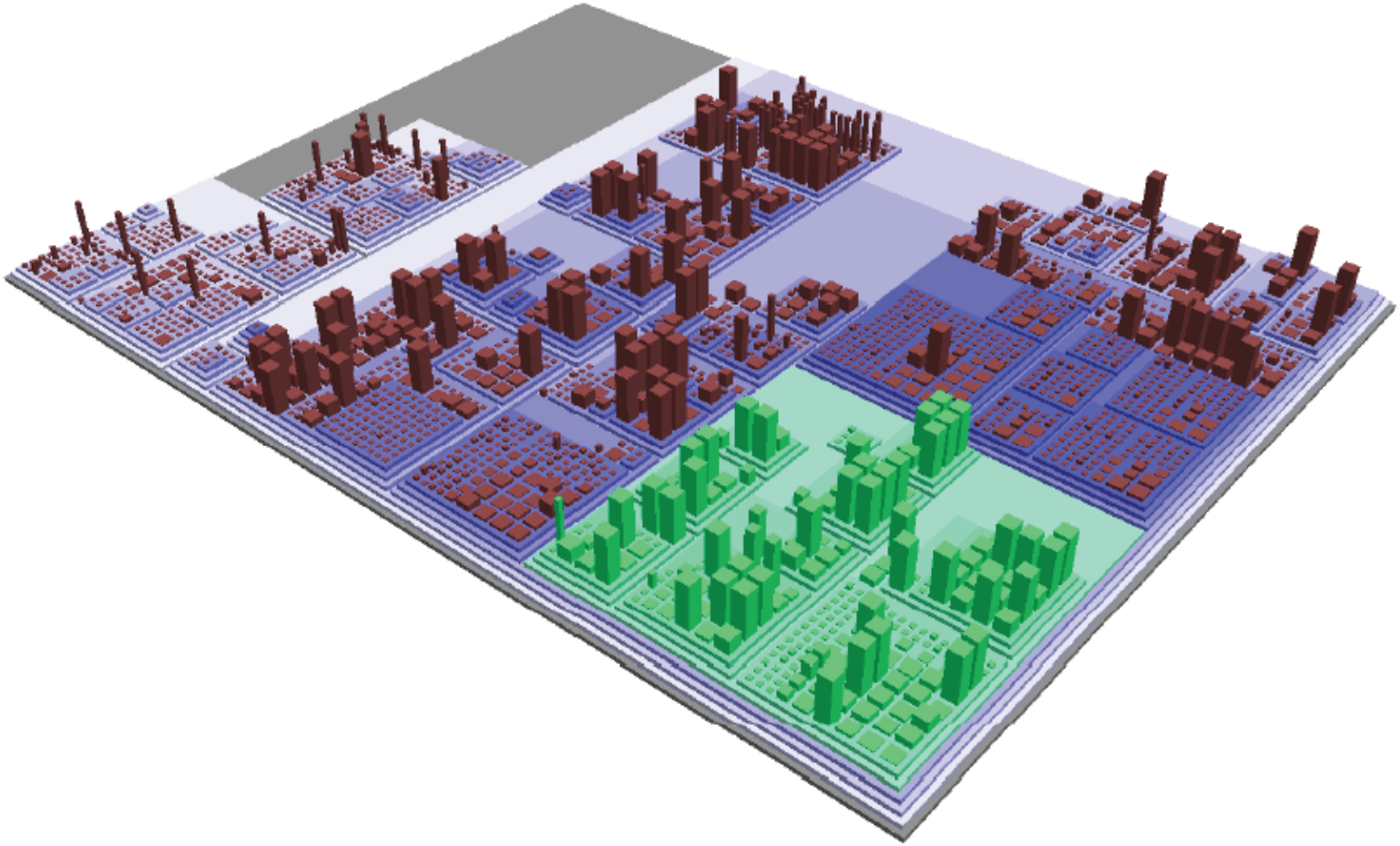
Metrics and Visualization

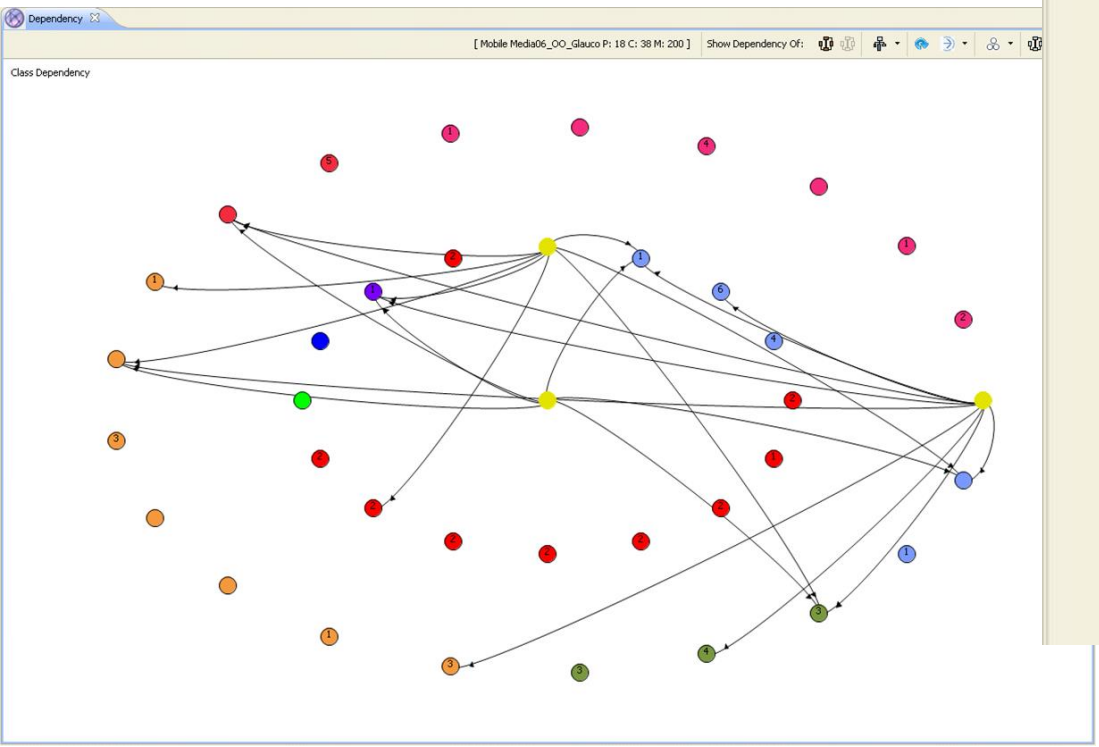
- Evaluating the design with metrics is a hard task
  - Metrics are too fine grained and generate a lot of data to analyze
- Visualization has long been used to break down the complexity of information

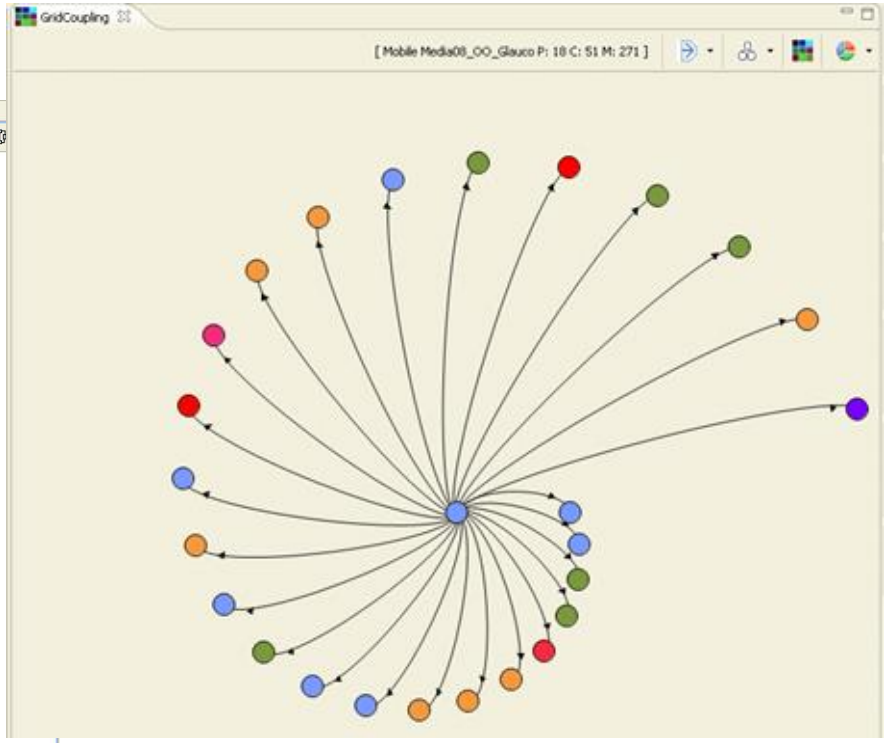
System as a City



R. Wettel and M. Lanza. Visualizing Software Systems as Cities. In 4th IEEE International Workshop on Visualizing Software for Understanding and Analysis, pp. 92 - 99, 2007

Coupling between Classes





G. Carneiro *et al*. Identifying Code Smells with Multiple Concern Views Analysis. Brazilian Symposium on Software Engineering (SBES). Salvador, 2010.

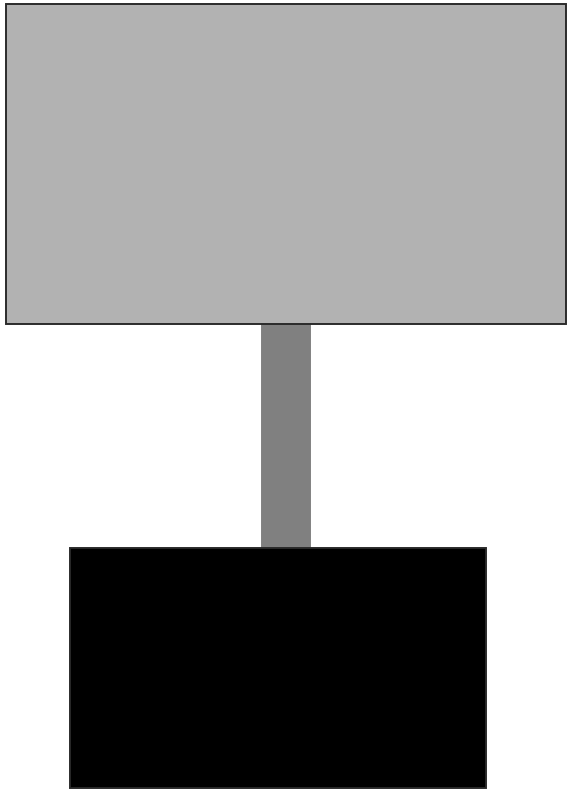
Polymetric Views

Polymetric Views

- A polymetric view is a metrics-enriched visualization of software entities and their relationships
- Notation
  - Rectangles display software entities
  - Edges represent relationships between entities

Metrics in a Polymetric View

- A single node can render up to five metrics
  - Width, Height, Position X, Position Y, and Color
- A single edge can render two metrics
  - Width and Color



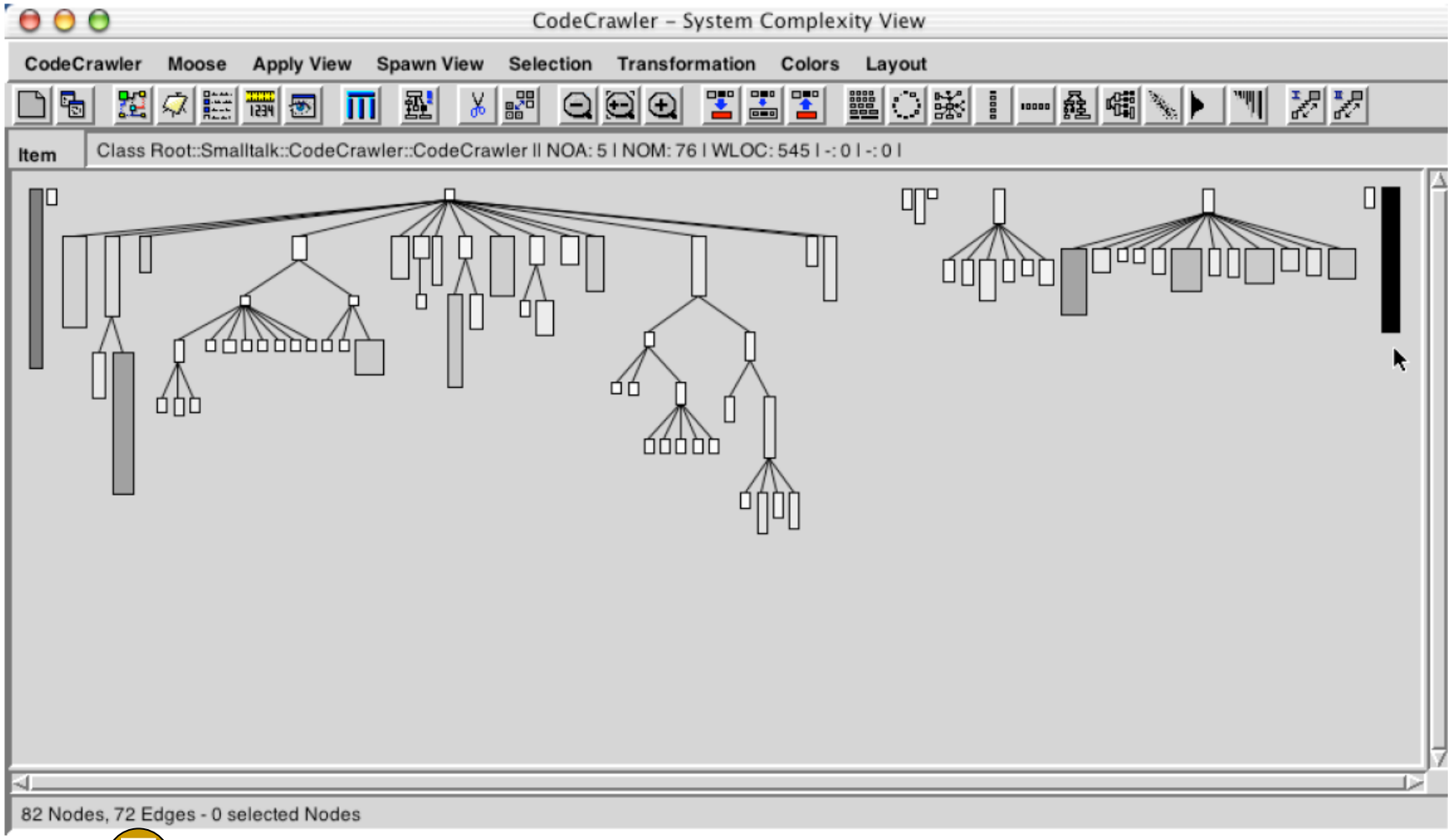
Node Size and Color

- Node Size
  - Width and height render two metrics
  - The convention is that they reflect size metrics, such as LOC and WMC
- Node Color
  - Usually, a grey scale from white to black is used to reflect a measurement
  - Higher measurement, darker node
  - It can be used for non-size metrics, such as LCOM and Cyclomatic Complexity

Node Position and Edge

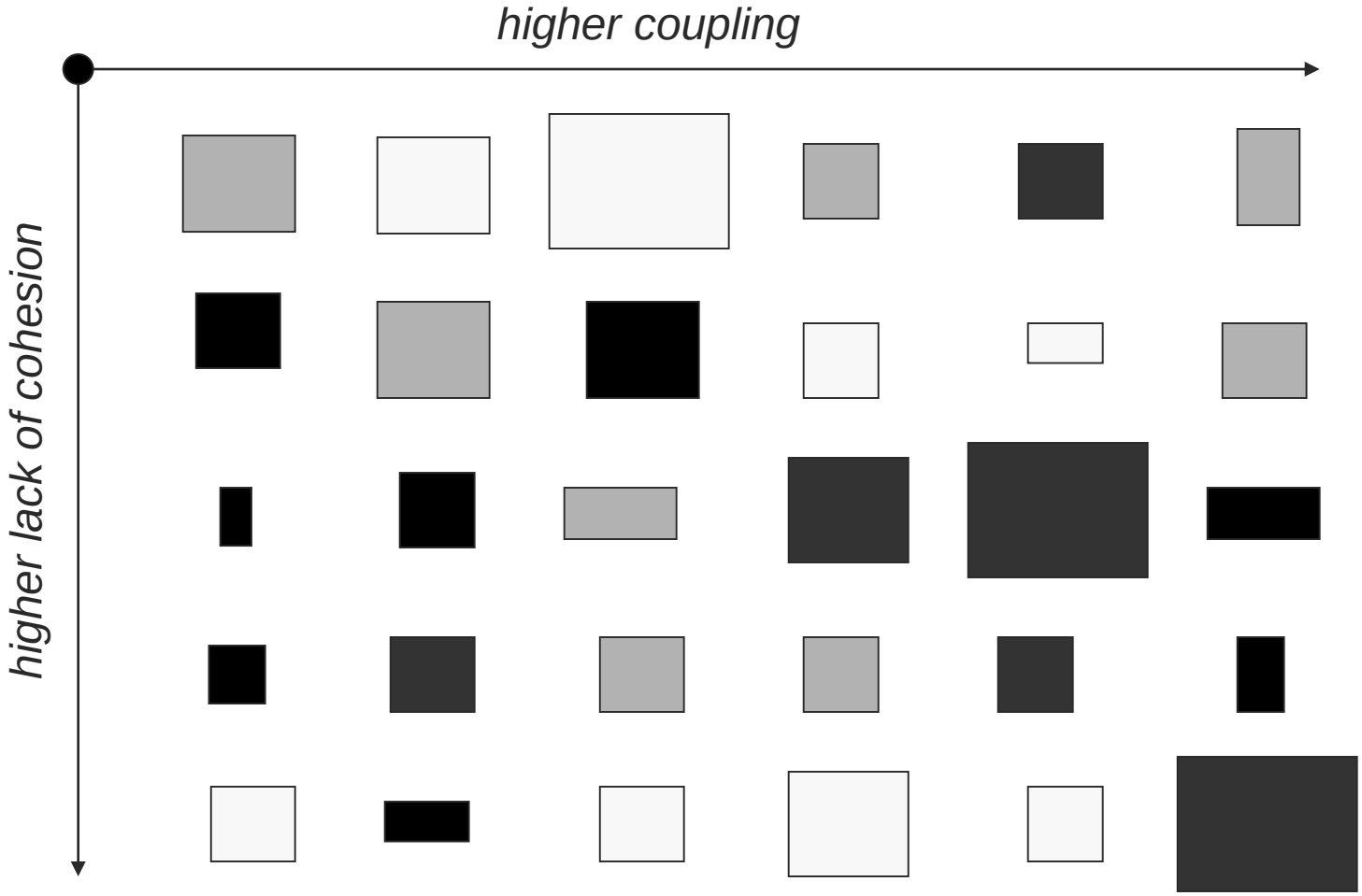
- Node Position
  - X and Y coordinates can reflect two metrics
  - This requires a fixed point as an absolute origin (gives the notion of distance)
  - It is not applicable in a tree view
- Edge Width and Color
  - Edge width and color render two metrics
  - Both metrics usually reflect the strength of a relationship, such as attribute accesses and method calls

Polymetric View as Tree View



Michele Lanza. CodeCrawler - Polymetric Views in Action. In 19th IEEE International Conference on Automated Software Engineering (ASE), pp. 394 - 395, 2004.

Polymetric View as Chess Board



Advantages

- A polymetric view renders numbers in a simple and effective way
- It is easy to be directly interpretable by the viewer
- It is a condensed view for scalability

Bibliography

- M. Lanza, R. Marinescu. **Object-Oriented Metrics in Practice**. Springer, 2006.
  - Section 3.2 Polymetric Views