

32. Werkzeuge zur Visualisierung

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- 1) Visualisierung von Graphen
 - 1) VCG
 - 2) AiSee
 - 3) LogLin und CroCoCosmos



Obligatorische Literatur

32.1 Visualisierungswerkzeuge für Graphen

Für Programm- oder Modellgraphen

Geschichte

- ▶ Edge (Frances Newbery-Paulisch, Karlsruhe 1992)
- ▶ VCG (G. Sander, EU-Projekt COMPARE, 1995, Universität Saarbrücken)
- ▶ Absint AiSee 1997-today
- ▶ Linloglayout aus Cottbus
 - <http://code.google.com/p/linloglayout/>
- ▶ <http://graphdrawing.org/> Symposium on Graph Drawing
- ▶ Liste von 1999:
- ▶ <http://rw4.cs.uni-sb.de/users/sander/html/gstools.html>

32.1.1 Visualisierungswerkzeug VCG (Visualization of Compiler Graphs)

Autor Dr. Georg Sander

<http://rw4.cs.uni-sb.de/users/sander/html/gsvcg1.html>

Im EU-Projekt COMPARE 1990-95

<ftp://ftp.cs.uni-sb.de/pub/graphics/vcg/doc/vcgdoc.ps.gz>

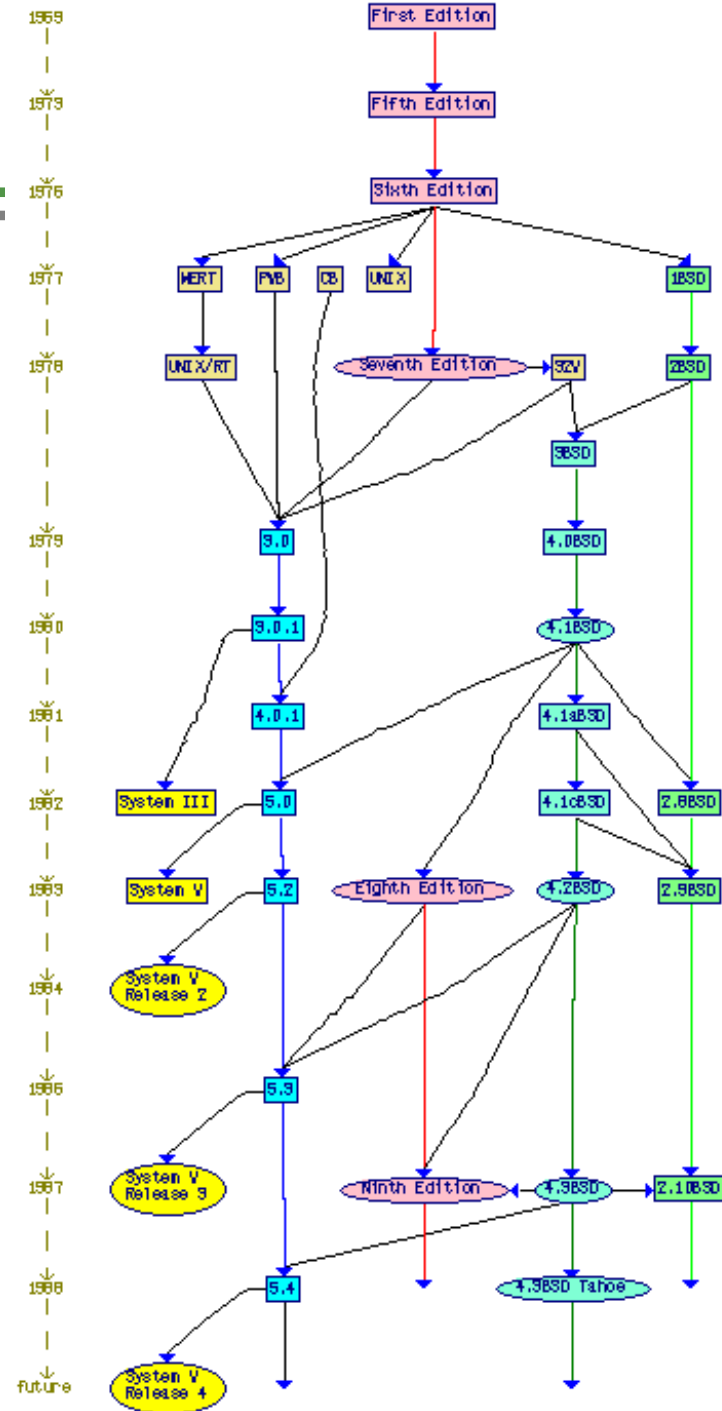
<http://rw4.cs.uni-sb.de/~sander/html/gspapers.html#graphlayout>

G. Sander: Visualisierungstechniken für den Compilerbau.

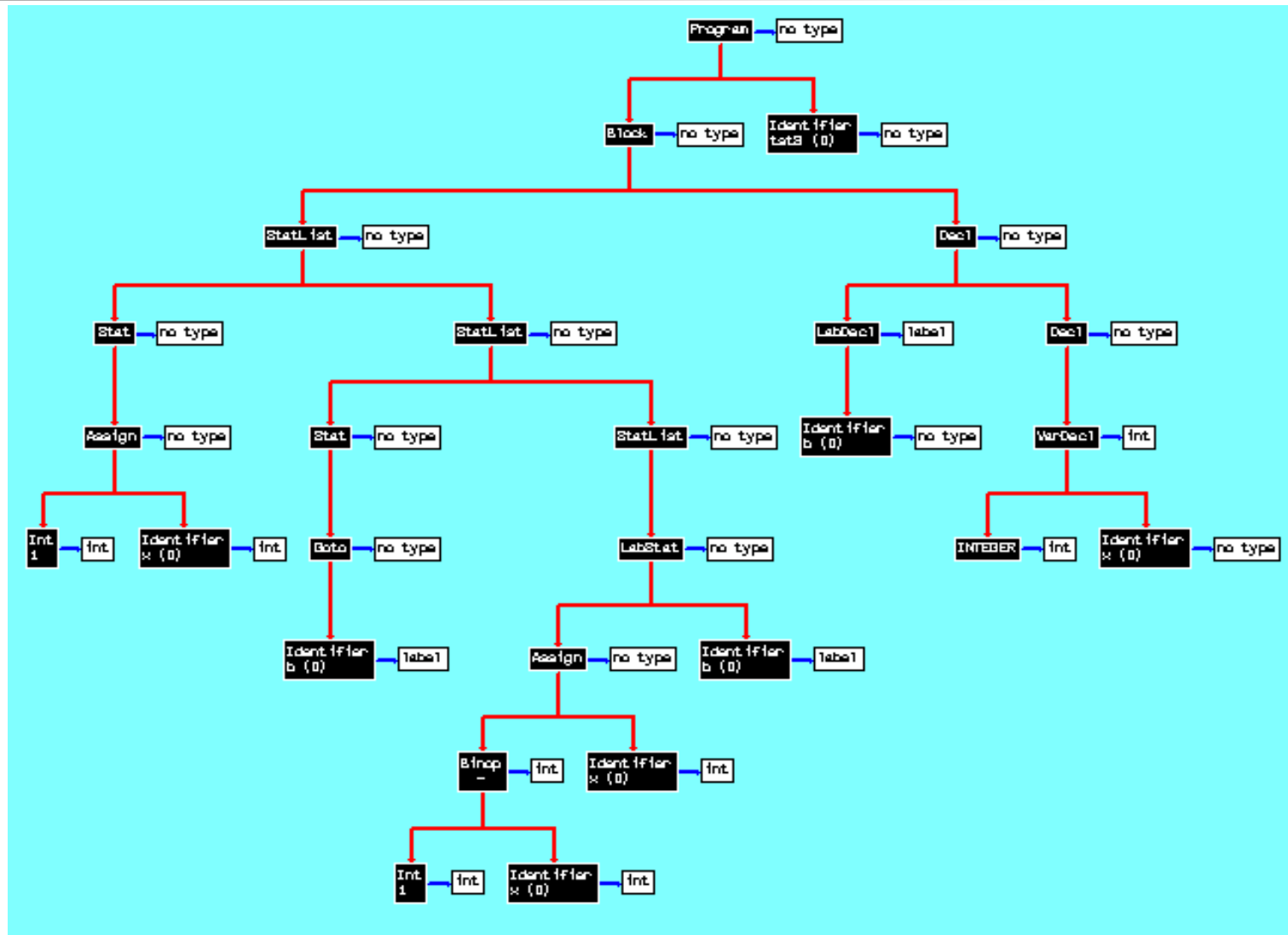
Dissertation, Universität des Saarlandes, Technische Fakultät, published with
Pirrot Verlag, 66125 Saarbrücken, ISBN 3-930714-20-5, 1996

[http://webscripts.softpedia.com/script/Development-Scripts-
js/Compilers/VCG-tool--27306.html](http://webscripts.softpedia.com/script/Development-Scripts-js/Compilers/VCG-tool--27306.html)

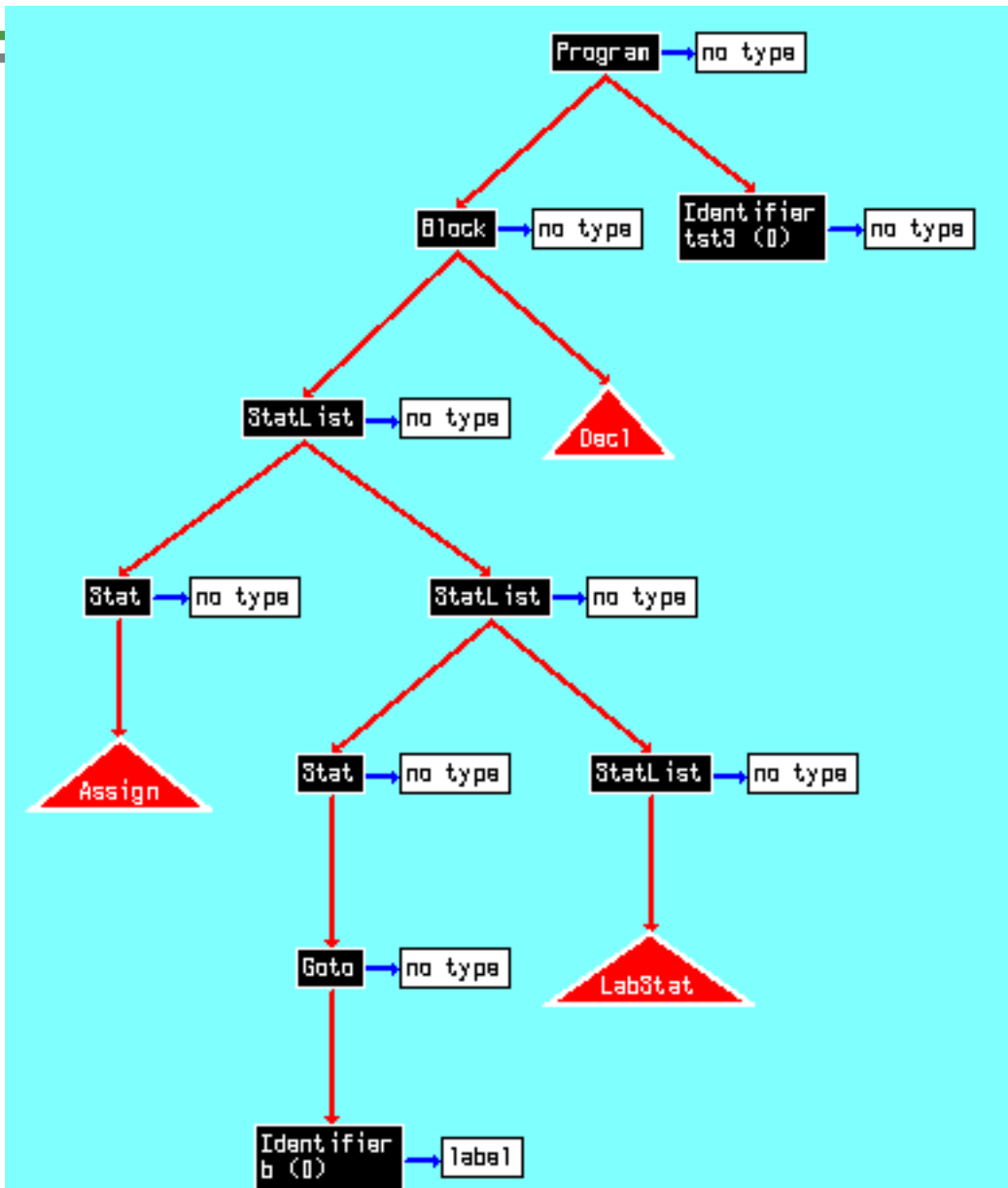
Timing Diagram



Attributierter Syntaxbaum



.. mit gefalteten Unterbäumen



32.1.2 Graph-Visualisierungswerkzeug AiSee von AbsInt

http://www.absint.com/aisee/index_de.htm

<http://www.absint.com/aisee/beispiele.htm>

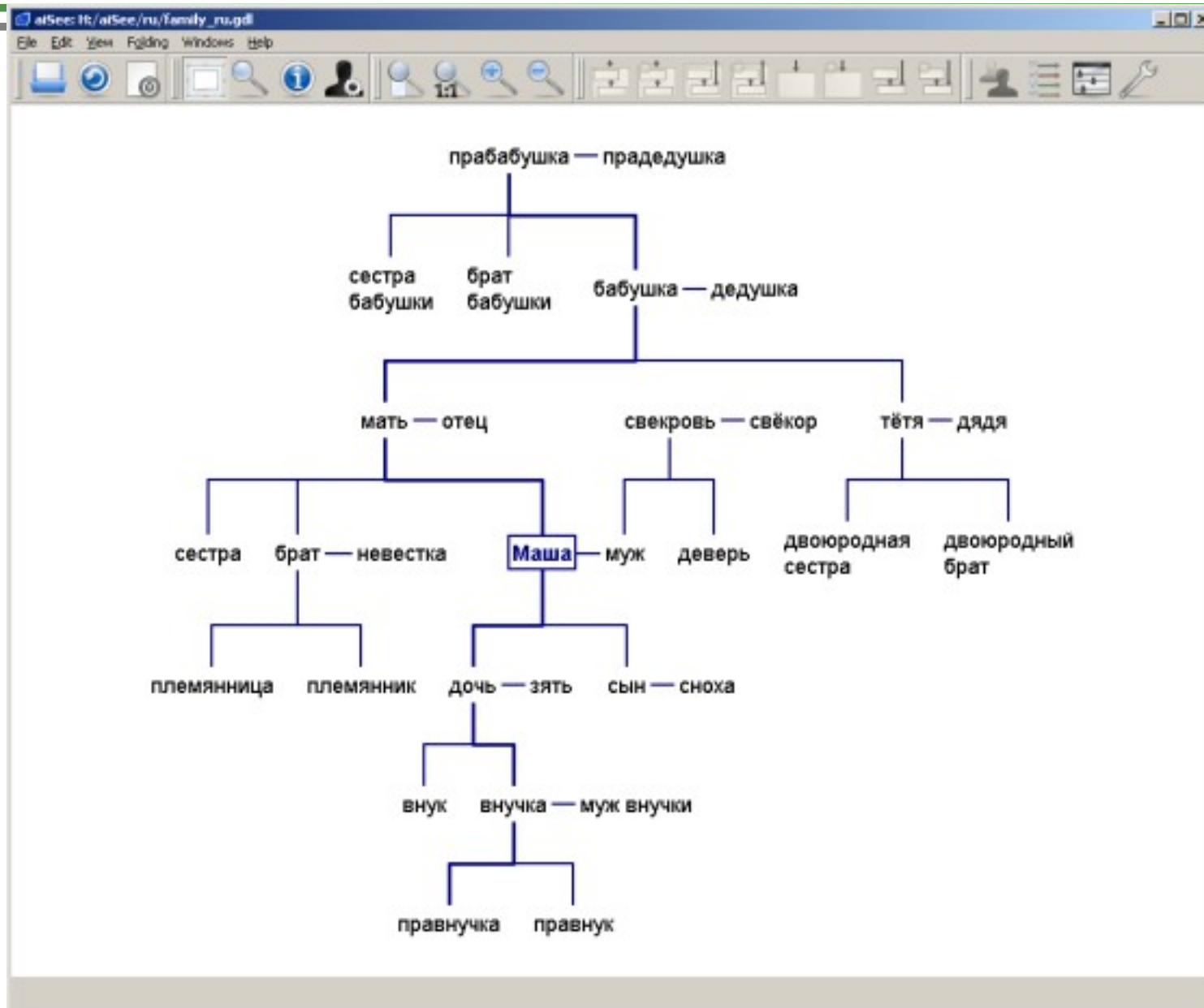
Kostenlose Demoverision

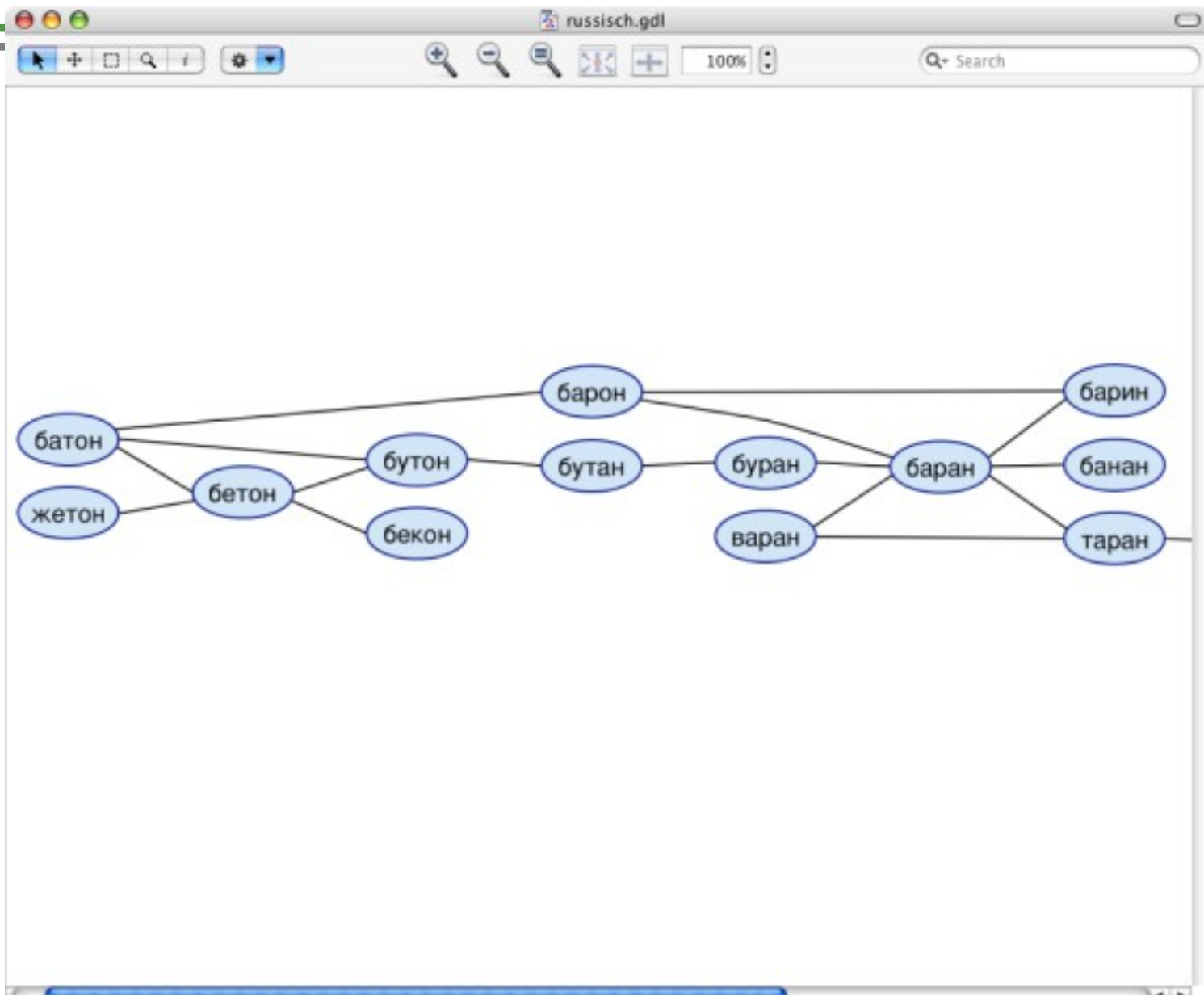
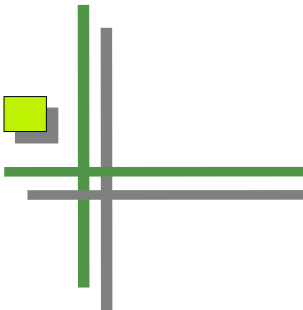
http://www.absint.com/aisee/download/index_de.htm

```
graph: { title:"kline"  
  status:wrapped  
  color:darkred  
  edge.color:darkred  
  shape:box  
  width:180  
  height:54  
  textcolor:white  
  borderwidth:2  
  bordercolor:9  
  label:"Koltsevaya\nLiniya"  
  textmode:left_justify  
  loc:{x:1484 y:438}  
  node.borderwidth:3  
  node.color:9
```

```
node: { title:"k1" loc:{x:530 y:440}  
  info1:"\f09Novoslobodskaya"  
  color:15 bordercolor:0  
  
  info3:"href:http://beeflowers.com/Metro/Novoslob  
odskaya/mainpage.htm;  
  
  target:_blank;onMouseOver:photoHref(11,'k1',12);  
onMouseOut:noPhoto()"  
}  
node: { title:"k2" loc:{x:630 y:440}  
  info1:"\f09Ploshchad Suvorova\n\f31under  
construction"  
  color:27 bordercolor:0 }  
edge: { source:"k1" target:"k2" }  
edge: { source:"k2" target:"k3" }  
}
```

Different Tree Layouts





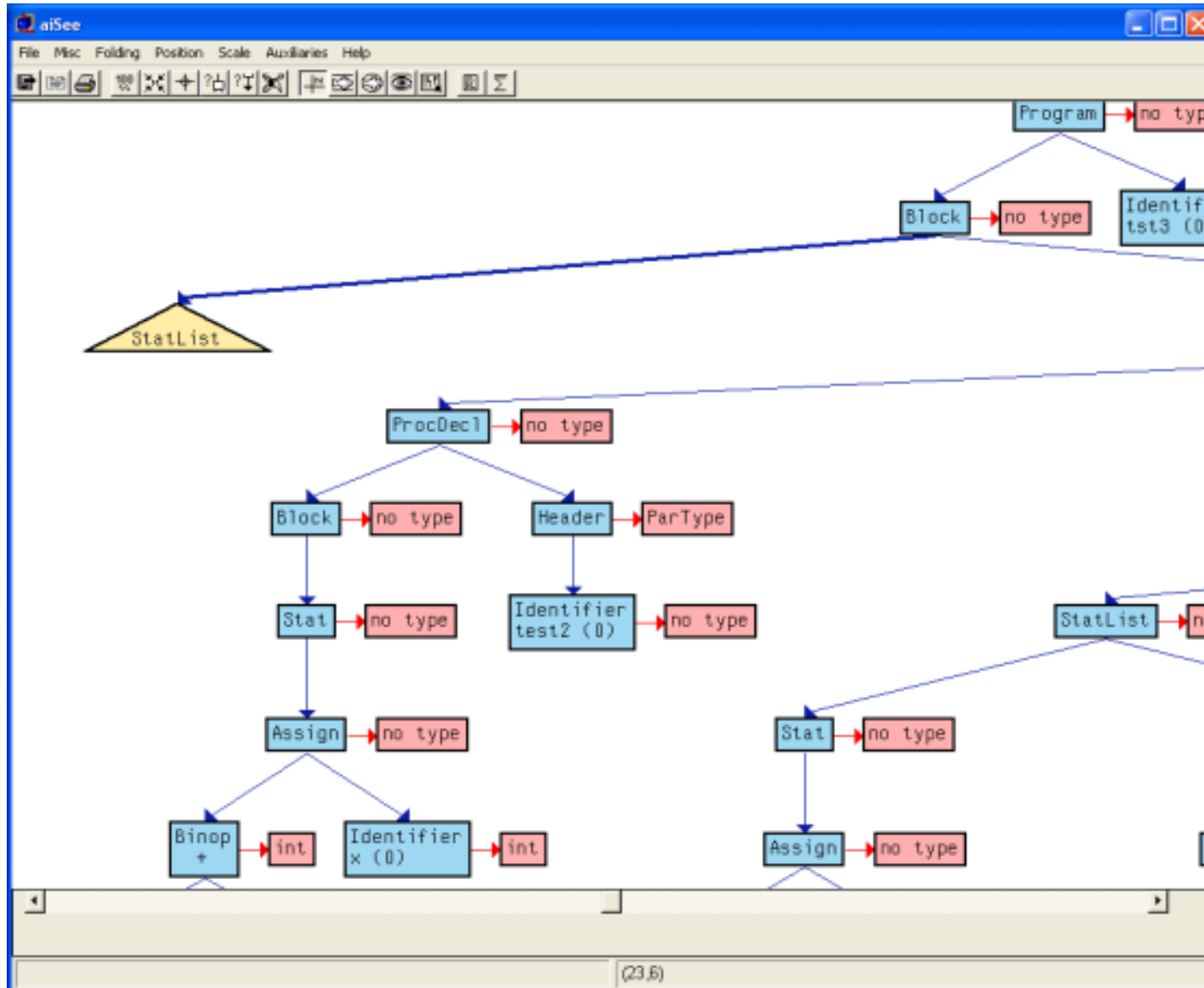
Laid out 19 nodes, 7 artificial nodes and 23 edges

e.htm

Alßmann, SEW



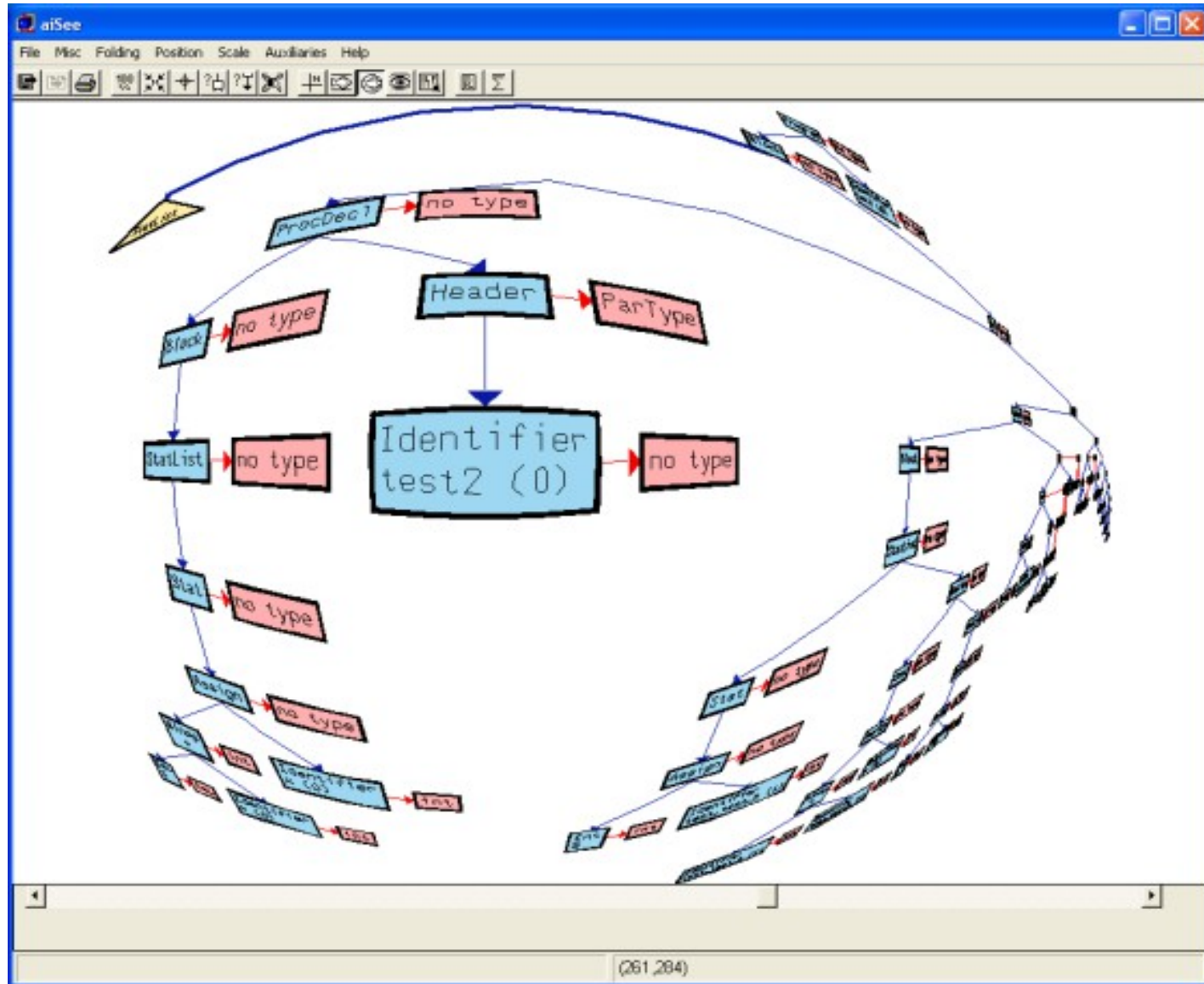
Visualisierung einer Internen Repräsentation eines Programms



de.htm



FishEye View



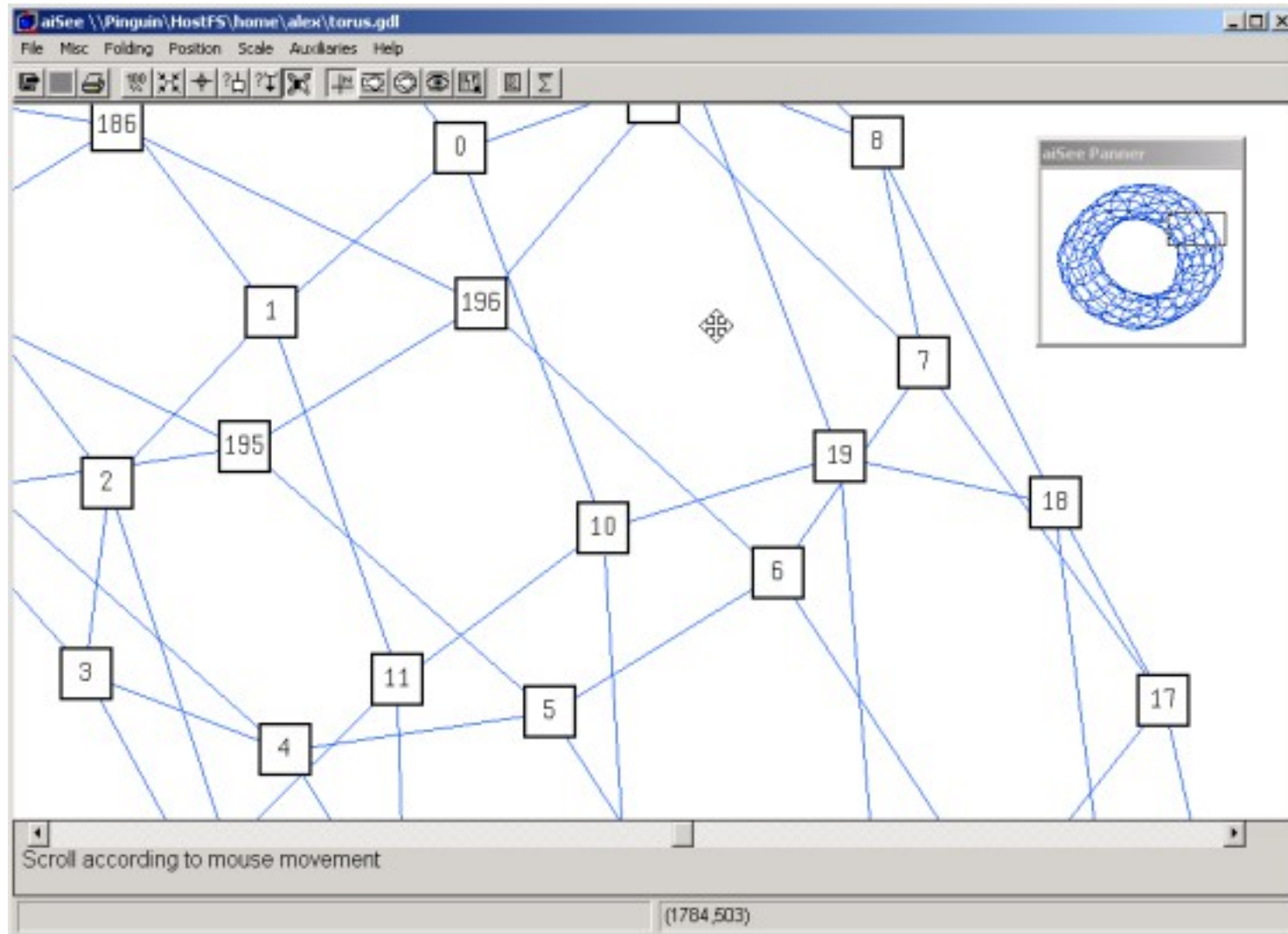
Knoten können aufgefaltet werden

The screenshot shows the aiSee application window with a network graph. The graph consists of nodes representing countries: Austria, Hungary, Slovenia, Romania, and Moldova. Hungary is the central node, connected to all other nodes. Two nodes are expanded to show detailed information:

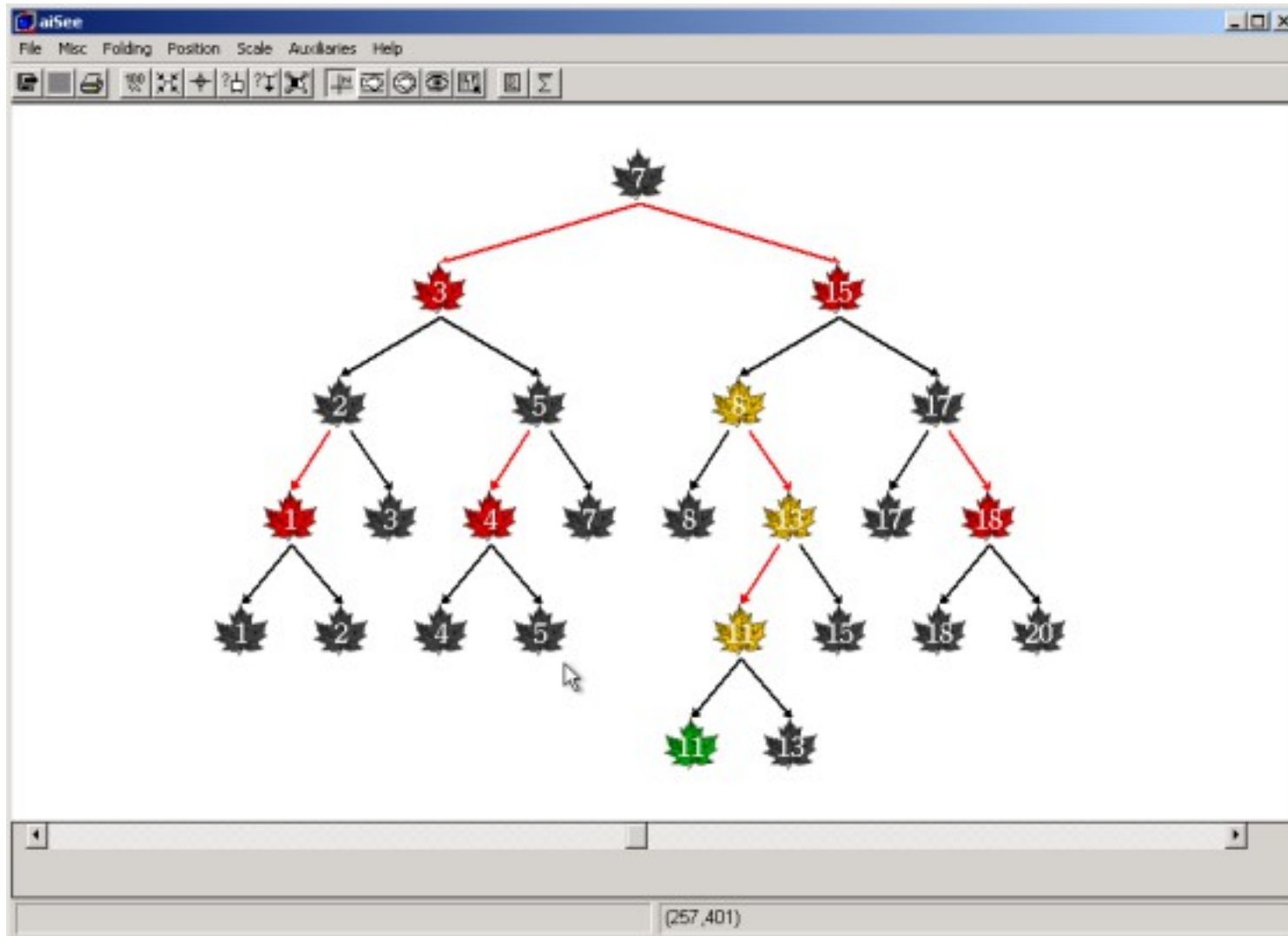
Country	Expense	Population	Capital	Time Zone	Language	Currency	National Holiday
Slovakia	49,035 km ²	5,296,000	Bratislava	CET	Slovak	krona	Aug 29th
Ukraine	603,700 km ²	52,158,000	Kiev	CET +1 hour	Ukrainian	karbovanez	

The status bar at the bottom of the window contains the text: "Select next node to get information. Right-click for cancel." and the coordinates "(1577,1048)".

Übersichtsfenster



Benutzerdefinierte Icons in Knoten



Faltoperationen

The screenshot displays the aiSee software interface. On the left, a control menu is open, listing various operations for manipulating subgraphs and boxes. The menu items include:

- Expose/Hide Edges...
- Fold Subgraph
- Box Subgraph
- Exclusive Subgraph
- Wrap/Unwrap Subgraph
- Cluster Subgraph
- Fold Region ...
- Box Region ...
- Exclusive Region ...
- Fold Neighbors ...
- Box Neighbors ...
- Exclusive Neighbors ...
- Fold Box** (highlighted)
- Unfold into Box (x)
- Unfold into Cluster (t)
- Unfold and Wrap (w)
- Unfold/Unbox (u)
- Box Summary Nodes Recursively (y)
- Unfold Summary Nodes Recursively
- Box all Summary Nodes (z)
- Unfold all Summary Nodes
- Exclusive
- All Subgraphs/Regions

The main window shows a control flow graph (CFG) with several basic blocks and instructions. The graph starts with a `time:0` node, followed by a `note 55 basic_block`. The flow then proceeds through several basic blocks, each containing instructions such as `set`, `plus`, `minus`, and `unspec`. The graph is divided into two main sections, `basic block 1` and `basic block 2`. The status bar at the bottom indicates the current operation: "Change a box into a summary node" and the coordinates "(190,7424)".

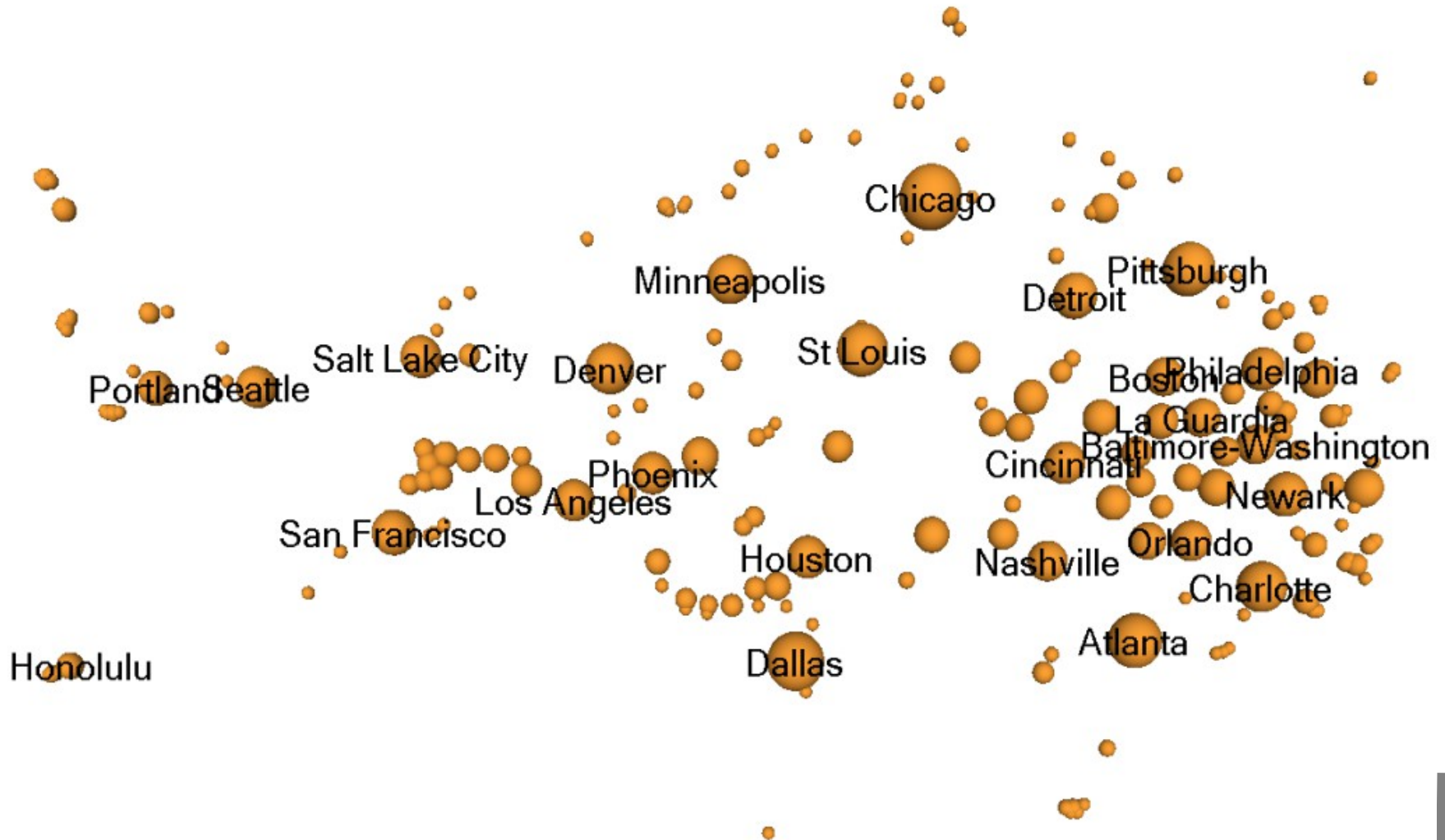
32.3 LinLog und CroCo Cosmos


- <http://www.informatik.tu-cottbus.de/~an/GD/>
 - <http://jgaa.info/volume11.html>
- Andreas Noack. Energy Models for Graph Clustering. Journal of Graph Algorithms. Vol. 11, no. 2, pp. 453-480, 2007.
<http://jgaa.info/accepted/2007/Noack2007.11.2.pdf>
- Lewerentz, Claus; Noack, Andreas. CroCoCosmos - 3D Visualization of Large Object-Oriented Programs. In Michael Jünger, Petra Mutzel (editors): Graph Drawing Software, pages 279-297. Springer-Verlag, 2003.

- ▶ Energiemodelle definieren Anziehungs- und Abstoßungskräfte für Knoten und Kanten von Graphen.
 - Sie erzeugen sehr interessante 3-D-Bilder, auch von großen Graphen
 - Rotation, Navigation, Zoom-In/Out ist möglich
 - Erzeugung von VRML möglich
- ▶ Die folgenden Bilder sind von
 - <http://www-sst.informatik.tu-cottbus.de/GD/erlinlog.html>

US Airline Routes

- ▶ Relative Verbindungsichte

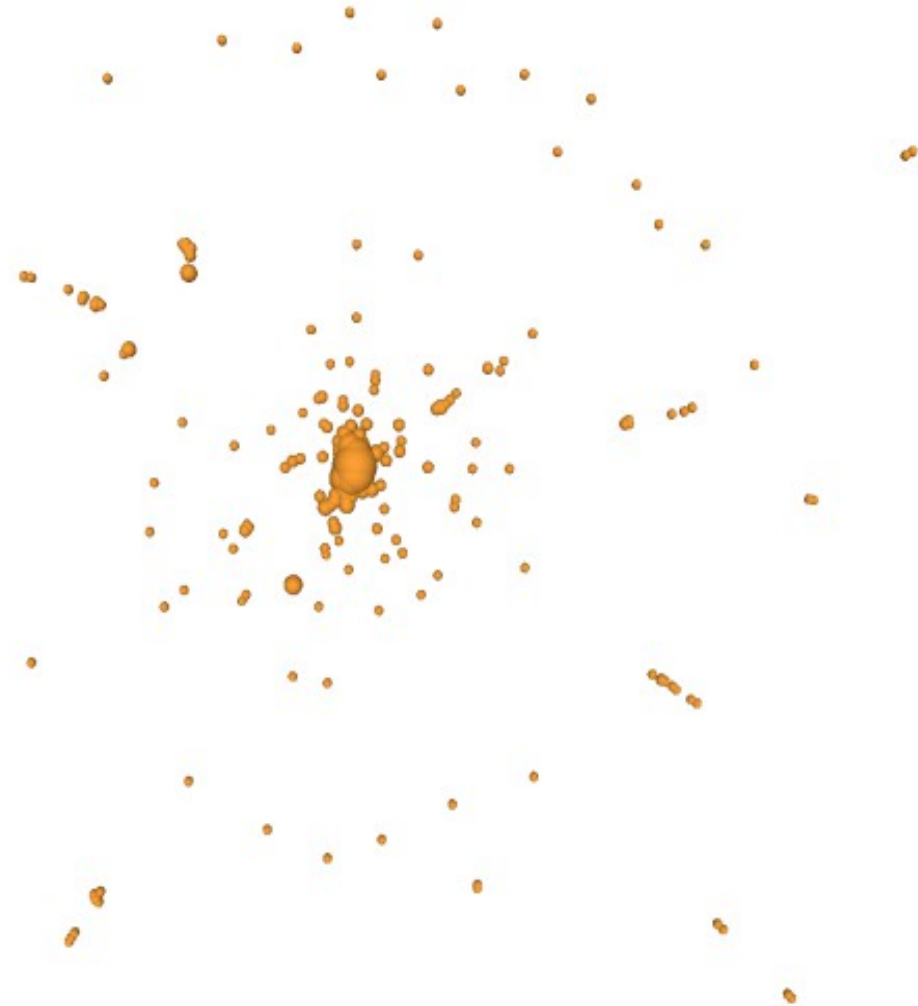




► Fruchterman-Reingold Modell

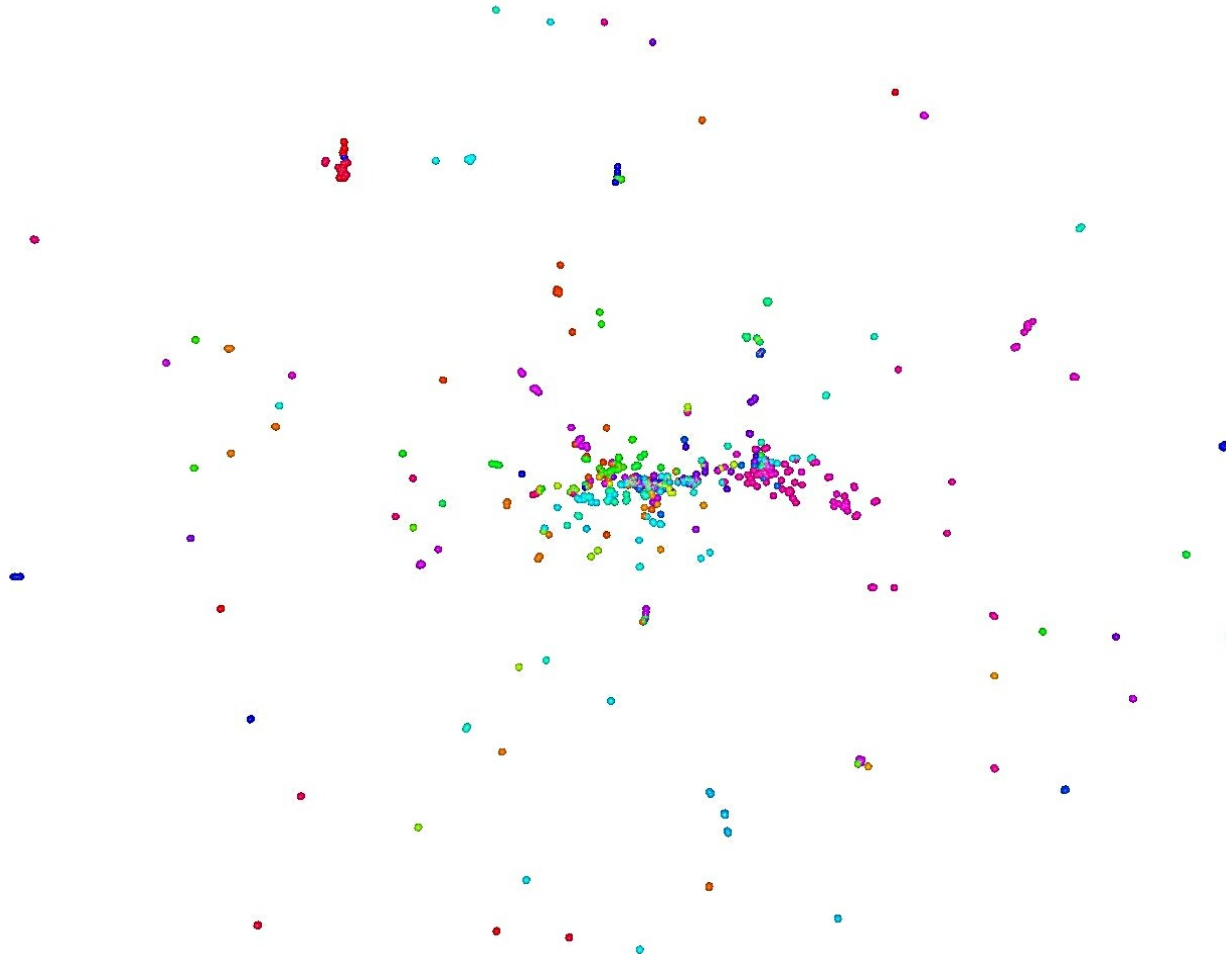


► Node-Repulsion Energiemodell

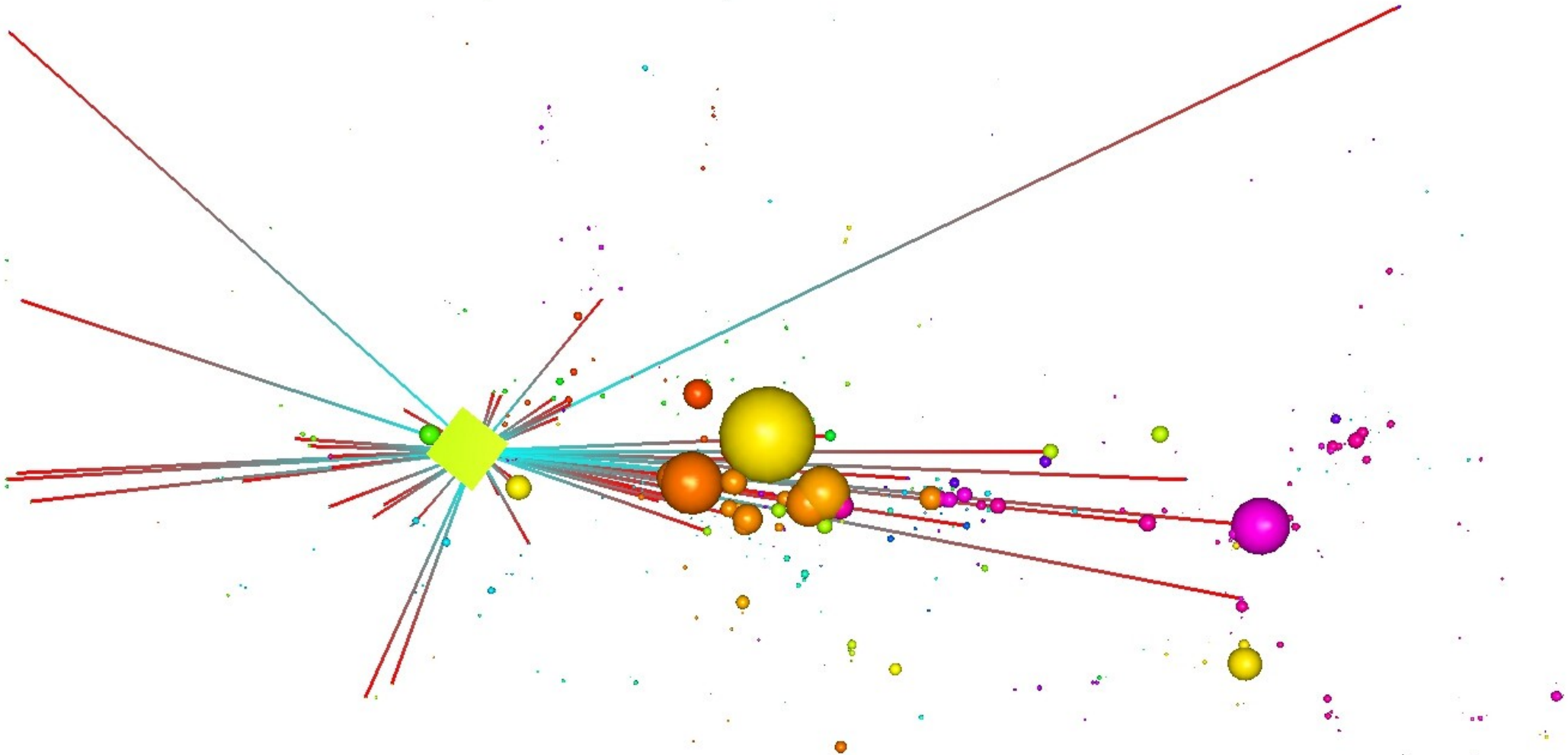


CroCoCosmos: LinLog Energiemodell eines Frameworks

- ▶ <http://www-sst.informatik.tu-cottbus.de/CrocoCosmos/gdsw.html>

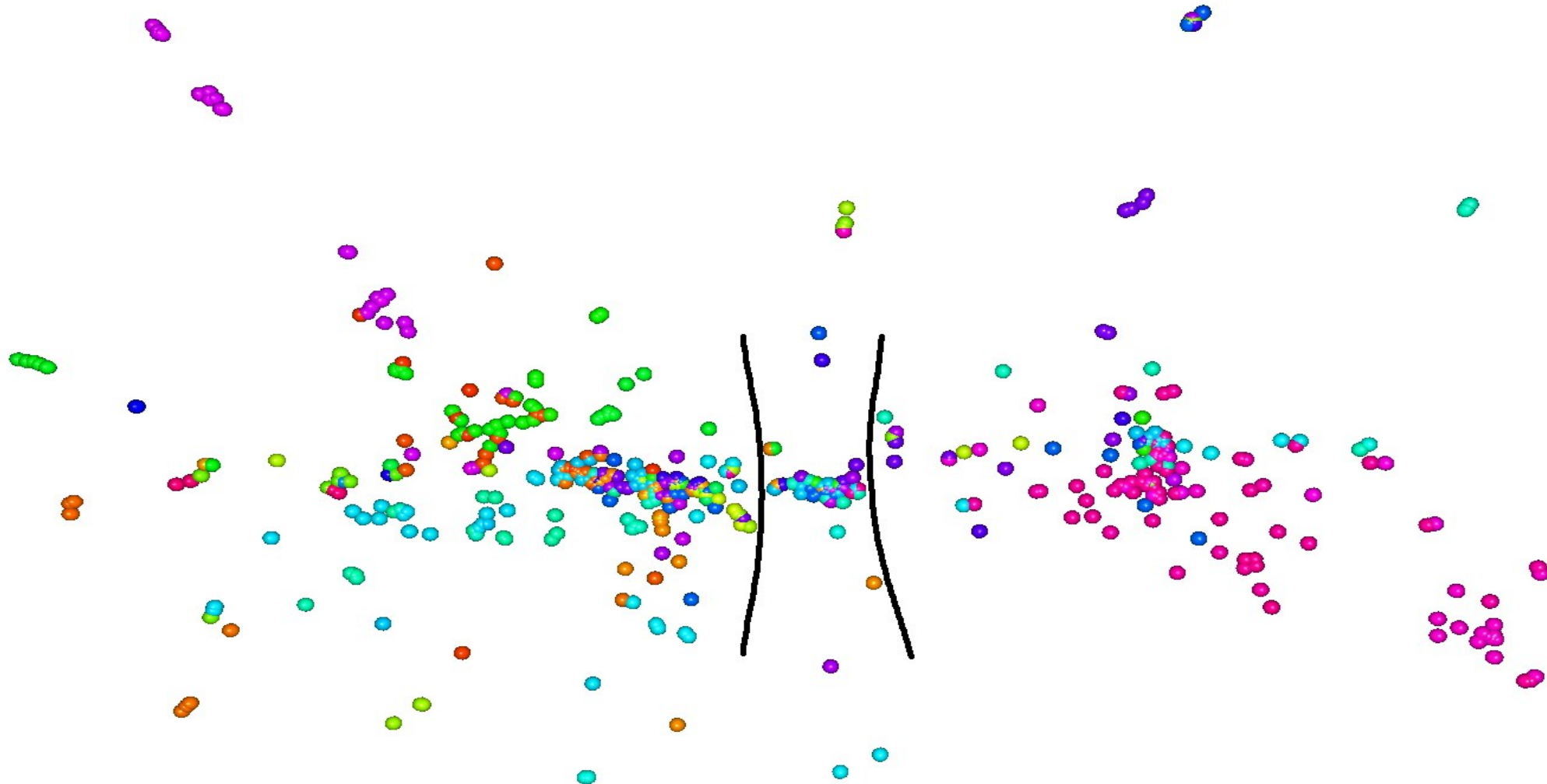


Aufrufgraph nach einigen Abstraktionen



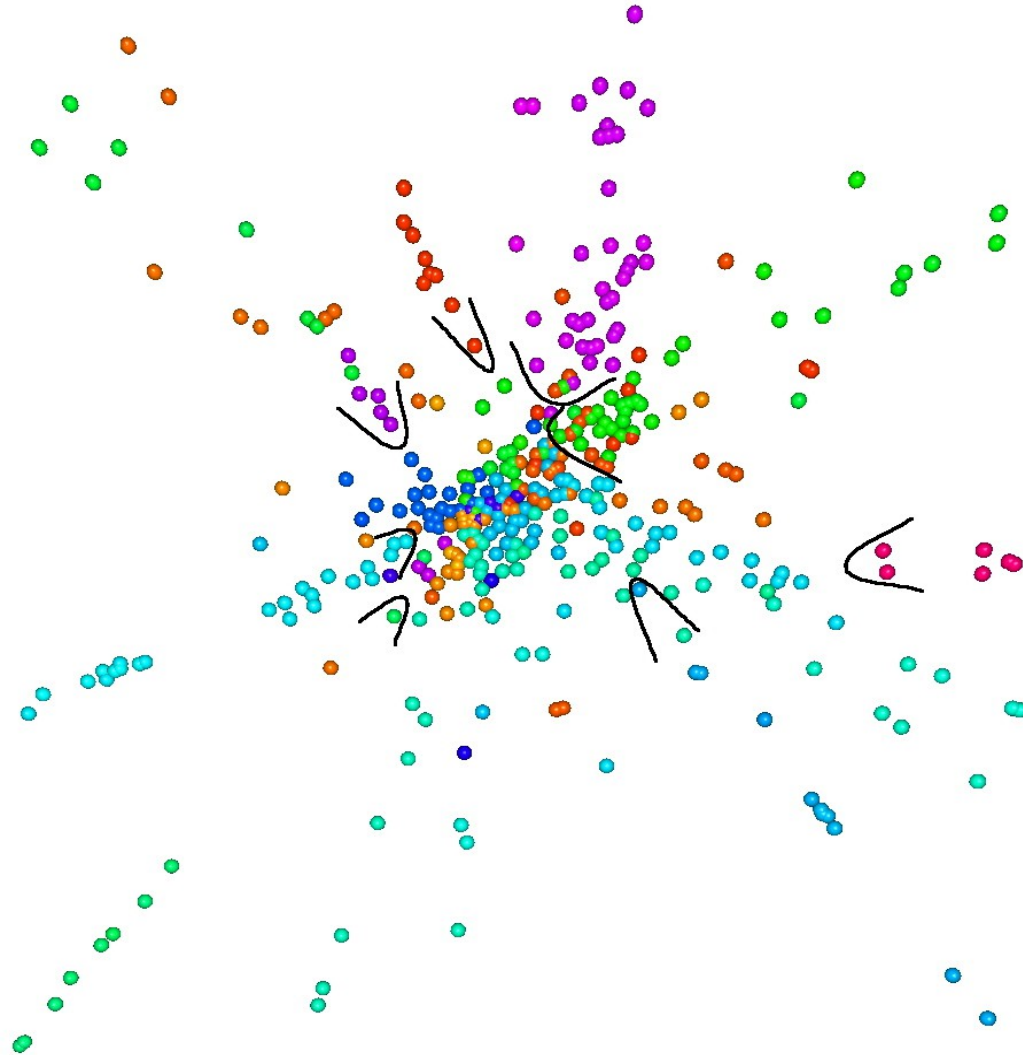
3-Schichten-Architektur sichtbar

- ▶ Links: GUI-Klassen, Rechts: Anwendungslogik, Mitte: verb. Klassen

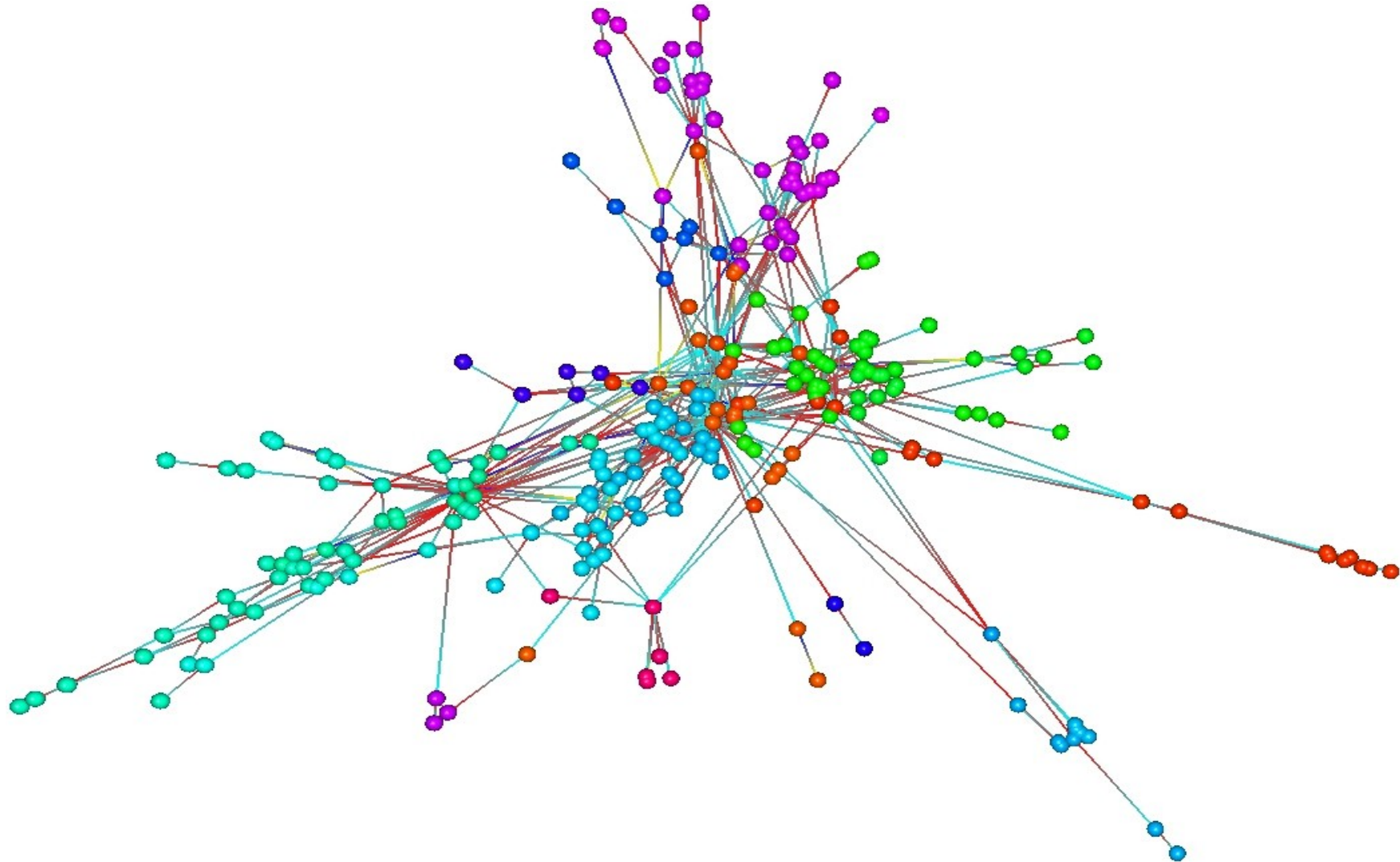


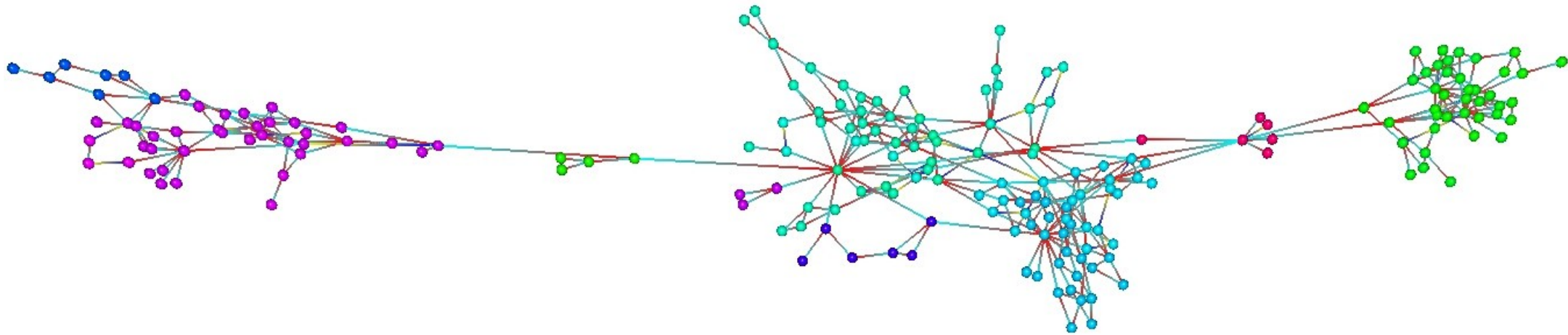
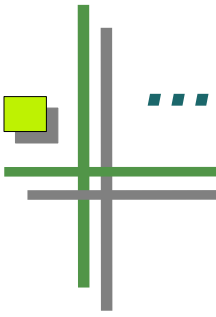
Visualisierung von Kohäsion und Kopplung

- ▶ Fruchertman-Reingold-Metrik zeigt gute Kohäsion, lose Kopplung (siehe Farben und Clustering)



Und weils so schön ist.. nochmal mit LinLog







SotoGraph aus Cottbus

- ▶ <http://www.hello2morrow.com/products/sotograph>



Axivion (ehemals Bauhaus) aus Bremen

- ▶ <http://www.axivion.com/index-en.html>



The End