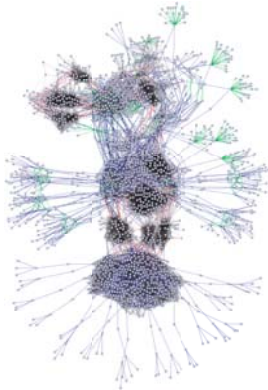
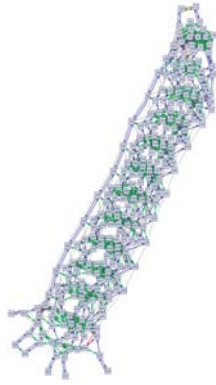


# Visualizing the Internal Structure of SAT Instances

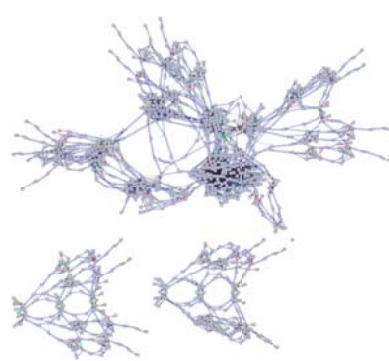
## Examples of Structured Instances



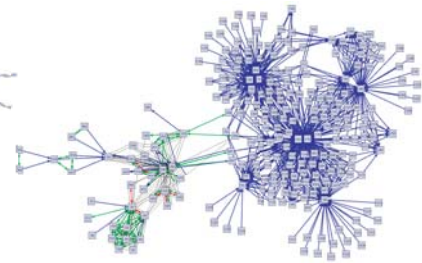
Software Verification  
(Alloy)



Planning  
(hanoi4)

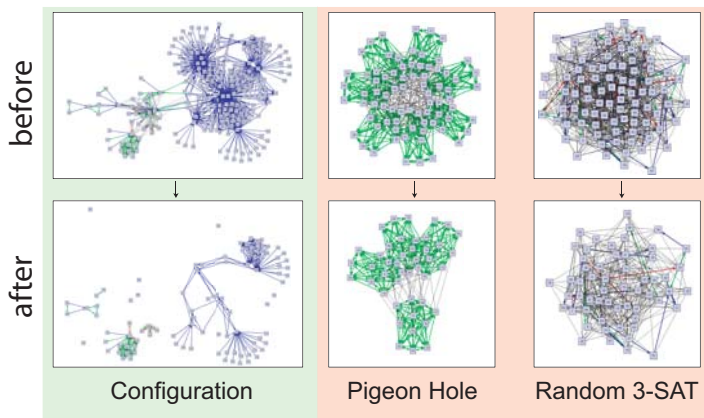


Hardware Verification  
(IBM BMC)



Product Configuration  
(Mercedes C-Class)

## Easy vs. Hard: Comparison of DPLL Dynamics



Compare graphs before/after 3 recursive calls (case splits) of DPLL algorithm.

Observations:

- **Easy problems:** decompos., considerable simplification
- **Hard problems:** no decomposition, “self-similarity”

## How to Make Use of Problem Structure?

- Try to partition the problem recursively (balanced MIN-CUT)
- Treat long implication chains especially (“chains” of 2-clauses)
- Use problem specific literal selection strategies (e.g.: select consecutive split variables from same connected component)

**Invent new ideas inspired by graphical visualization!**

