

Constraint activities at SICS

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SICStus group

- Cooperation between Mats Carlsson and Nicolas Beldiceanu continues even though Nicolas has now moved to Nantes. The following papers present some recent results:

1. *Dispensation Order Generation for Pyrosequencing*

Mats Carlsson & Nicolas Beldiceanu. Proc. Asia-Pacific Bioinformatics Conference (APBC2004). Dunedin, New Zealand, 2004.

2. *From Constraints to Finite Automata to Filtering Algorithms*

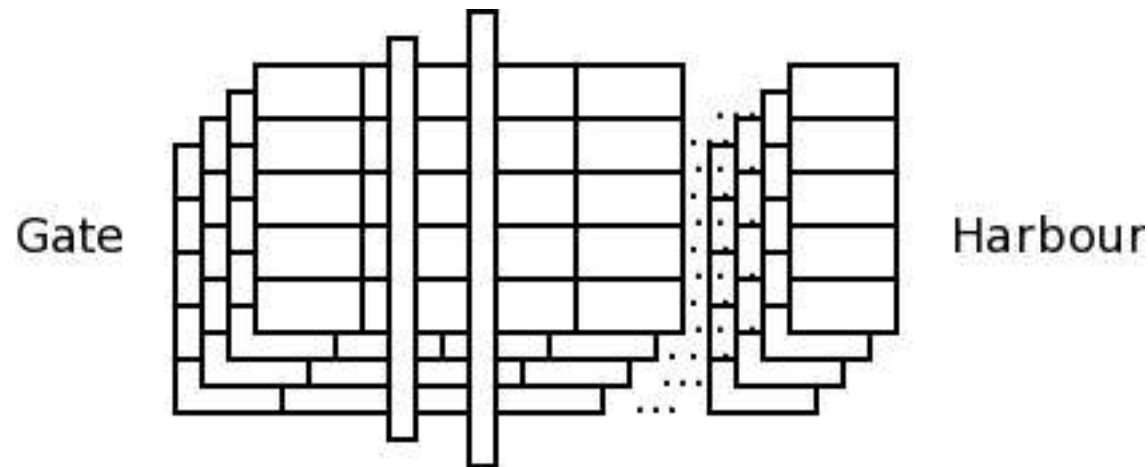
Mats Carlsson & Nicolas Beldiceanu. Proc. European Symposium on Programming. Barcelona, 2004.

3. *Sweep synchronization as a global propagation mechanism.*

Nicolas Beldiceanu, Mats Carlsson, and Sven Thiel. Proc. CP-AI-OR 2003.

Applications

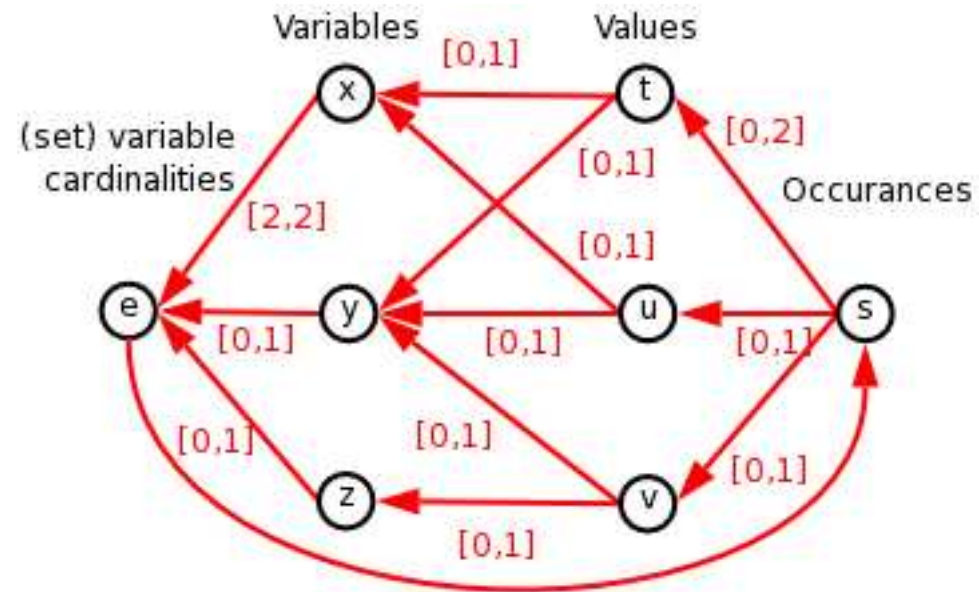
- Vehicle resource levelling for Green Cargo now in production
 - Reschedule departures (± 15 min.) in order to decrease maximum vehicles requirement
 - Original constraint model augmented to include more side-conditions and translated to IP-model and integrated to productions system
 - Gains of 3-5 engines in peak hours
- Container storage block sorting and stacking for harbours (feasibility study for ABB Cranes)



- $40 \times 5 \times 4$ containers with destinations at either end of block and deadlines varying from 0-5 days should be re-stacked during low loads to minimise relocations during loading and delivery operations
- Interesting side conditions: Stack sortedness weighted by proximity to deadline, wind sensitivity, n “holes” in block. Dynamic change of deadlines.
- CP, LP and Local search methods tried

Work on new cardinality constraint

- Symmetric cardinality constraint (SCC) introduced by graduate student in Västerås (W. Kocjan) generalises GCC by introducing the possibility of binding a constrained no. of values to each variable
- This makes the flow model completely symmetric and captures naturally certain types of personnel planning problems
 - E.g. personnel with multiple potential roles and minimum working hours and with requirements of for a certain no of personnel of each role
- AC filtering based on flow algorithms similar to that of Regin's original GCC-paper



- Paper submitted for publication (SICS report also forthcoming)

Work on constraint based local search in V'ås

- Finishing touches to licentiate thesis of graduate student in Västerås on techniques for using global constraints in local search
- General method to assign cost to violated global constraint
- Methods for incremental updates of neighbourhood and cost for global constraints
- Efficient implementation