Implied Constraints for Automaton Constraints

M. Andreina Francisco, Pierre Flener, Justin Pearson

The Automaton Constraint

DAF augmented with accumulators can encode a constraint on asequence S of variables using an automaton whose size does not depend on the length of S [Beldiceanu & al., CP 2004].

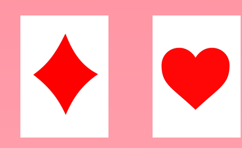
It is unknown how to maintain domain consistency efficiently for most of them.

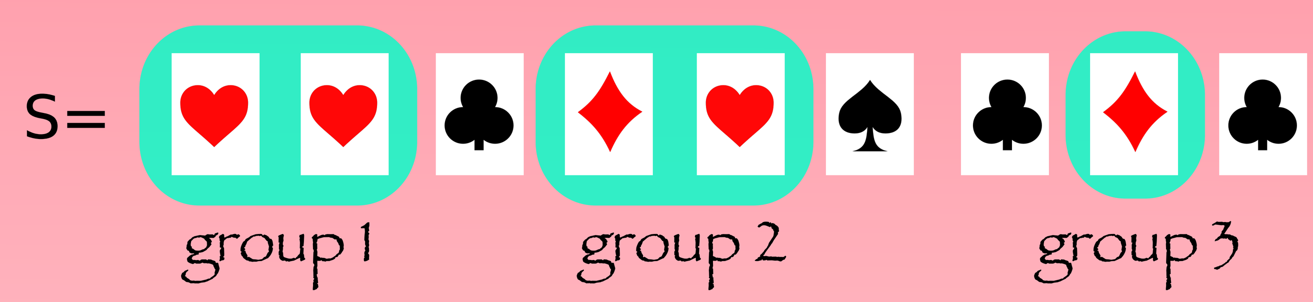
Invariants on accumulators are a way to enhance propagation.

Example

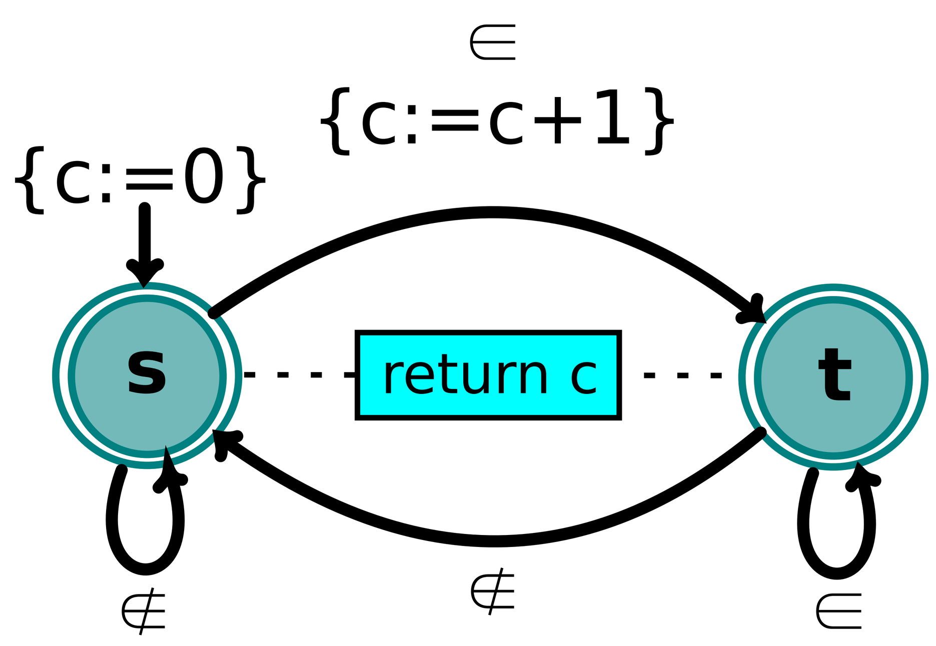
The **nGroup(N, S, W)** constraint holds if and only if there are N groups of values from the set W in the sequence S of variables.

The following instance holds:

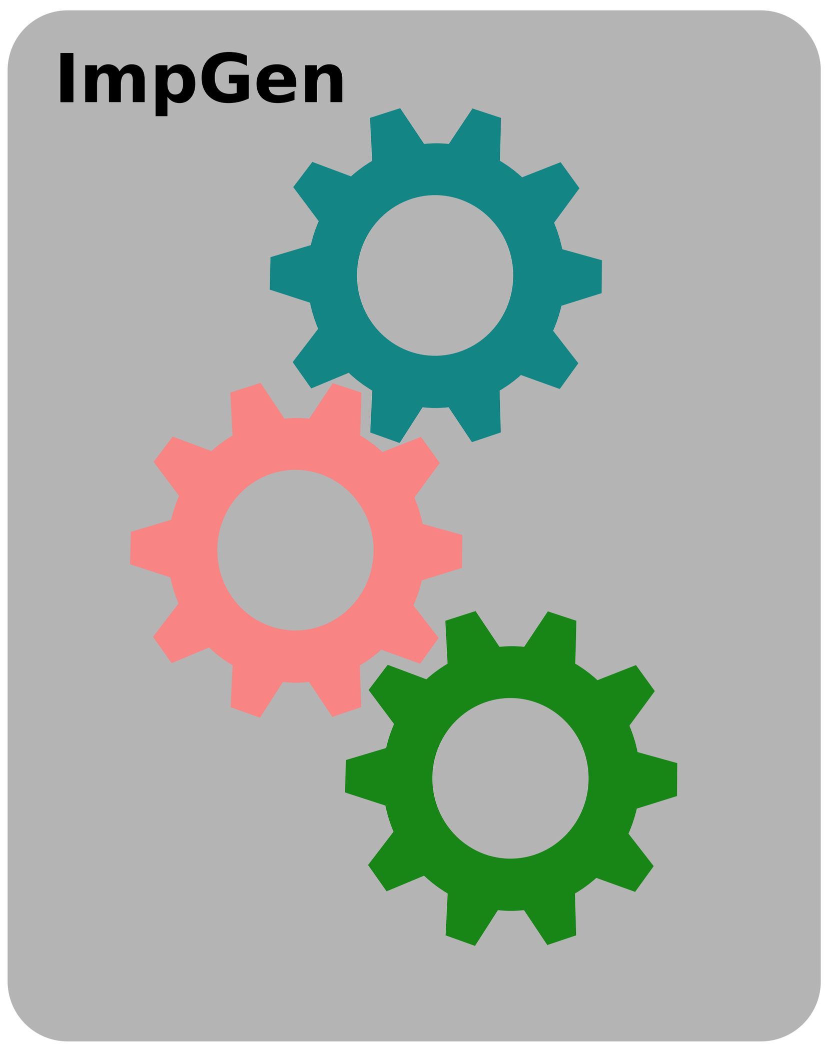
N=3 W= 

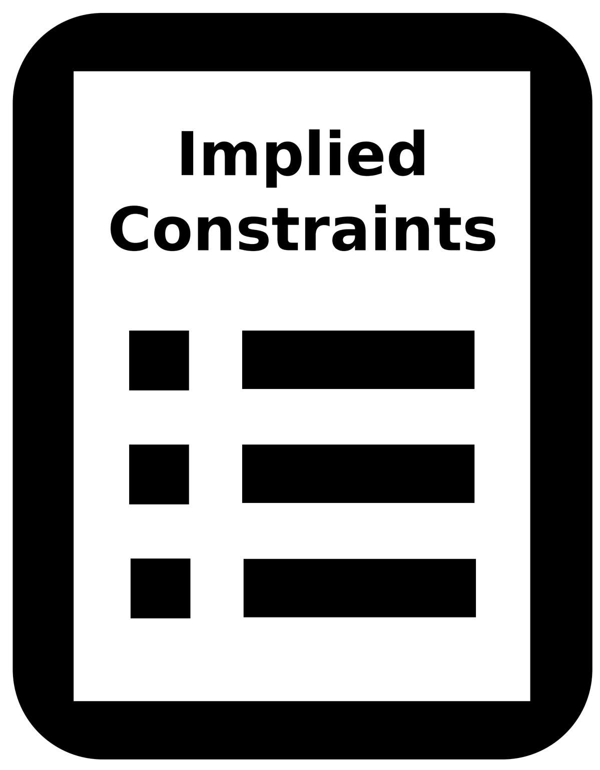


nGroup automaton



Options





Available options

Basic: linear inequalities containing only current accumulator values (i.e. $c_i \geq 0$)

History Variables: number of previous accumulator values (i.e. $c_{i-2}+1 \geq c_i$)

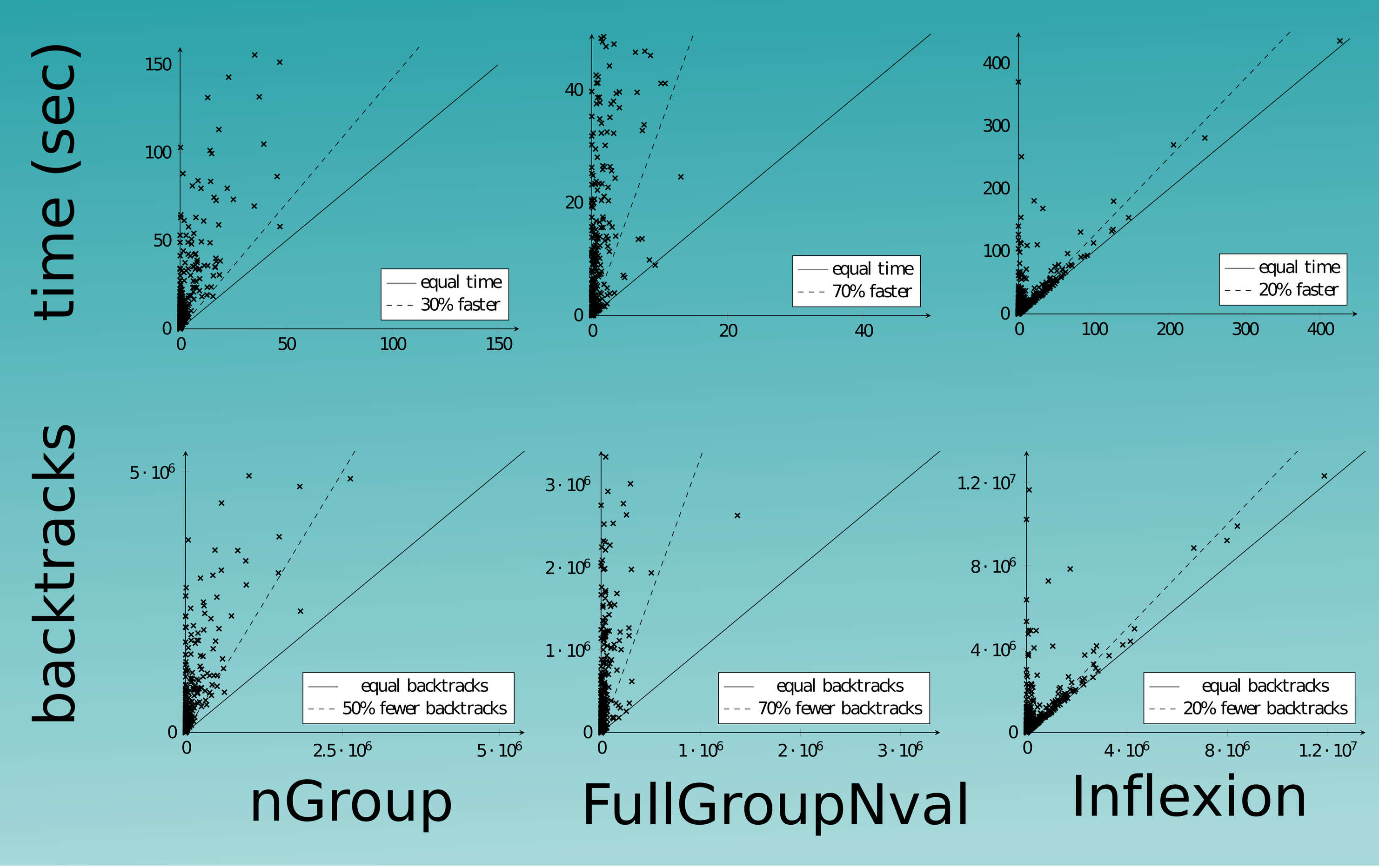
State Variable: include a variable q representing the current state (i.e. $c_i - c_{i-1} \leq q$)

State Specific Implied Constraints: generate ICs that hold at specific states (i.e. $q=s \Rightarrow c_i=c_{i-1}$)

Index Variable: include the current index (i.e. $2c_i \leq i$)

Experiments

Ran on sets of random problems



maria.andreina.francisco@it.uu.se