5.379 strictly_decreasing

DESCRIPTION LINKS GRAPH AUTOMATON

Origin Derived from strictly_increasing.

Constraint strictly_decreasing(VARIABLES)

Argument VARIABLES : collection(var−dvar)

Restriction required(VARIABLES, var)

Purpose The variables of the collection VARIABLES are strictly decreasing.

Example $(\langle 8, 4, 3, 1\rangle)$

The strictly_decreasing constraint holds since $8 > 4 > 3 > 1$.

Typical $|\text{VARIABLES}| > 2$

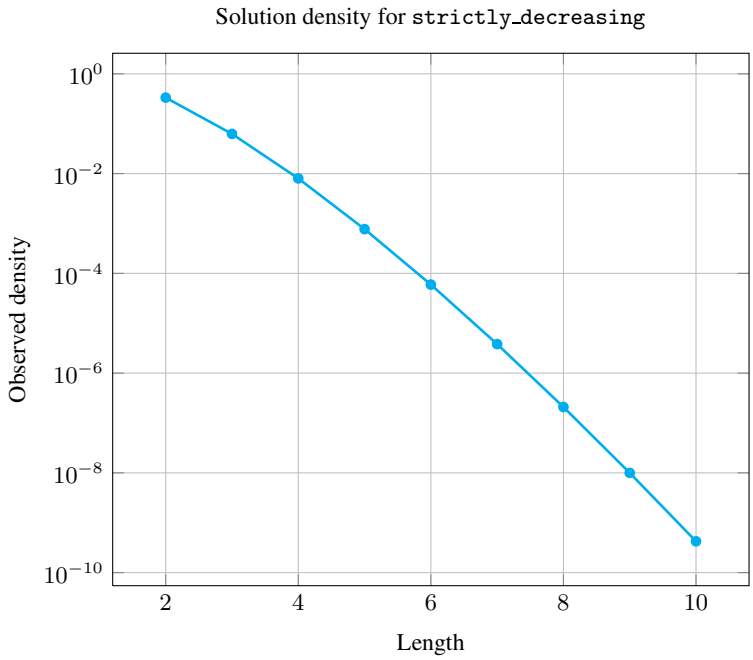
Symmetry One and the same constant can be added to the var attribute of all items of VARIABLES.

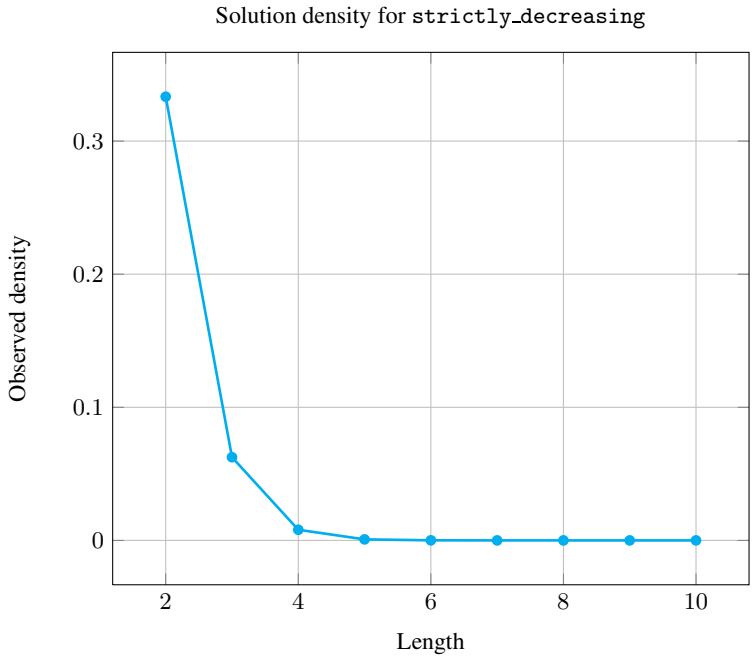
Arg. properties Contractible wrt. VARIABLES.

Counting

Length (n)	2	3	4	5	6	7	8	9	10
Solutions	3	4	5	6	7	8	9	10	11

Number of solutions for strictly_decreasing: domains $0..n$





Systems increasingNValue in **Choco**, rel in **Gecode**.

See also **common keyword:** `increasing` (*order constraint*).

comparison swapped: strictly_increasing.

implies: alldifferent, decreasing.

Keywords

characteristic of a constraint: automaton, automaton without counters, reified automaton constraint.

constraint network structure: sliding cyclic(1) constraint network(1).

constraint type: decomposition, order constraint.

filtering: arc-consistency.

Arc input(s)	VARIABLES
Arc generator	$PATH \mapsto$ collection(variables1, variables2)
Arc arity	2
Arc constraint(s)	variables1.var > variables2.var
Graph property(ies)	**NARC**= |VARIABLES| − 1

Graph model Parts (A) and (B) of Figure 5.736 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NARC** graph property, the arcs of the final graph are stressed in bold.

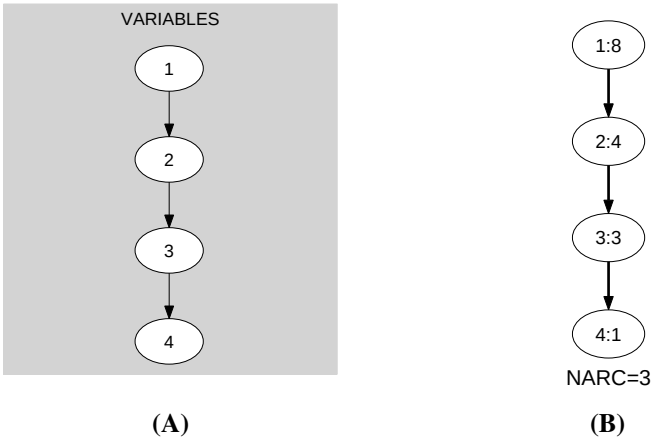


Figure 5.736: Initial and final graph of the strictly_decreasing constraint

Automaton

Figure 5.737 depicts the automaton associated with the strictly_decreasing constraint. To each pair of consecutive variables $(\mathtt{VAR}_i, \mathtt{VAR}_{i+1})$ of the collection VARIABLES corresponds a 0-1 signature variable S_i. The following signature constraint links $\mathtt{VAR}_i$, $\mathtt{VAR}_{i+1}$ and S_i: $\mathtt{VAR}_i \leq \mathtt{VAR}_{i+1} \Leftrightarrow S_i$.

Figure 5.737: Automaton of the strictly_decreasing constraint

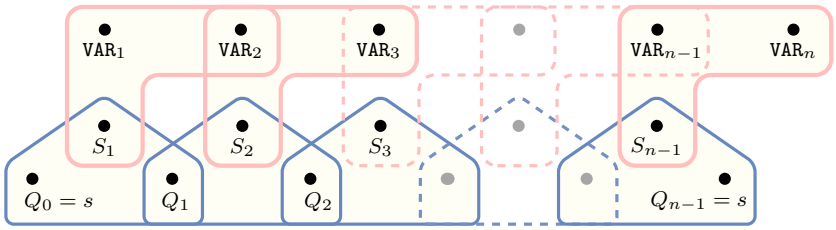


Figure 5.738: Hypergraph of the reformulation corresponding to the automaton of the strictly_decreasing constraint