5.297 open_atleast

DESCRIPTION LINKS GRAPH

Origin Derived from atleast and open_global_cardinality.

Constraint open_atleast(S, N, VARIABLES, VALUE)

Arguments

S	:	svar
N	:	int
VARIABLES	:	collection(var−dvar)
VALUE	:	int

Restrictions

$S \geq 1$
$S \leq |VARIABLES|$
$N \geq 0$
$N \leq |VARIABLES|$
required(VARIABLES, var)

Purpose Let $\mathcal{V}$ be the variables of the collection VARIABLES for which the corresponding position belongs to the set S. Positions are numbered from 1. At least N variables of $\mathcal{V}$ are assigned value VALUE.

Example $(\{2,3,4\}, 2, \langle 4,2,4,4\rangle, 4)$

The open_atleast constraint holds since, within the last three (i.e., $S = \{2,3,4\}$) values of the collection $\langle 4,2,4,4\rangle$, at least $N = 2$ values are equal to value $VALUE = 4$.

Typical

$N > 0$
$N < |VARIABLES|$
$|VARIABLES| > 1$

Symmetries

- N can be decreased to any value ≥ 0.
- An occurrence of a value of VARIABLES.var that is different from VALUE can be replaced by any other value.

Arg. properties

Suffix-extensible wrt. VARIABLES.

See also

common keyword: open_among, open_global_cardinality *(open constraint,value constraint)*.
comparison swapped: open_atmost.
hard version: atleast.
used in graph description: in_set.

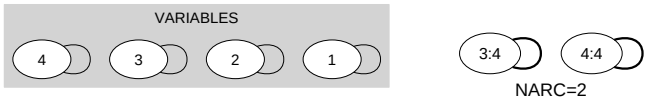
Keywords

constraint arguments: constraint involving set variables.
constraint type: open constraint, value constraint.
modelling: at least.

Arc input(s)	VARIABLES
Arc generator	$SELF \mapsto$ collection(variables)
Arc arity	1
Arc constraint(s)	• variables.var = VALUE • in_set(variables.key, S)
Graph property(ies)	**NARC** $\geq$ N

Graph model Since each arc constraint involves only one vertex (VALUE is fixed), we employ the $SELF$ arc generator in order to produce a graph with a single loop on each vertex. Variables for which the corresponding position does not belong to the set S are removed from the final graph by the second condition of the arc-constraint.

Parts (A) and (B) of Figure 5.632 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NARC** graph property, the loops of the final graph are stressed in bold.



(A) **(B)**

Figure 5.632: Initial and final graph of the open_atleast constraint