

5.297 `open_atmost`

	DESCRIPTION	LINKS	GRAPH
Origin	Derived from <code>atmost</code> and <code>open_global_cardinality</code> .		
Constraint	<code>open_atmost(S, N, VARIABLES, VALUE)</code>		
Arguments	<code>S</code> : <code>svar</code> <code>N</code> : <code>int</code> <code>VARIABLES</code> : <code>collection(var-dvar)</code> <code>VALUE</code> : <code>int</code>		
Restrictions	$S \geq 1$ $S \leq \text{VARIABLES} $ $N \geq 0$ <code>required(VARIABLES, var)</code>		
Purpose	<p>Let \mathcal{V} be the variables of the collection <code>VARIABLES</code> for which the corresponding position belongs to the set <code>S</code>. Positions are numbered from 1. At most <code>N</code> variables of \mathcal{V} are assigned value <code>VALUE</code>.</p>		
Example	$(\{2, 3, 4\}, 1, \langle 2, 2, 4, 5 \rangle, 2)$		
	<p>The <code>open_atmost</code> constraint holds since, within the last three (i.e., $S = \{2, 3, 4\}$) values of the collection $\langle 2, 2, 4, 5 \rangle$, at most <code>N</code> = 1 value is equal to value <code>VALUE</code> = 2.</p>		
Typical	$N > 0$ $N < \text{VARIABLES} $ $ \text{VARIABLES} > 1$		
Symmetries	<ul style="list-style-type: none"> <code>N</code> can be <code>increased</code>. An occurrence of a value of <code>VARIABLES.var</code> can be <code>replaced</code> by any other value that is different from <code>VALUE</code>. 		
Arg. properties	<code>Suffix-contractible</code> wrt. <code>VARIABLES</code> .		
See also	common keyword: <code>open_among</code> , <code>open_global_cardinality</code> (<i>open constraint, value constraint</i>). comparison swapped: <code>open_atleast</code> . hard version: <code>atmost</code> . used in graph description: <code>in_set</code> .		
Keywords	constraint arguments: constraint involving set variables. constraint type: open constraint, value constraint. modelling: at most.		

Arc input(s)	VARIABLES
Arc generator	$SELF \mapsto \text{collection}(\text{variables})$
Arc arity	1
Arc constraint(s)	<ul style="list-style-type: none"> • <code>variables.var = VALUE</code> • <code>in_set(variables.key, S)</code>
Graph property(ies)	$\mathbf{NARC} \leq N$

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 5.614 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.

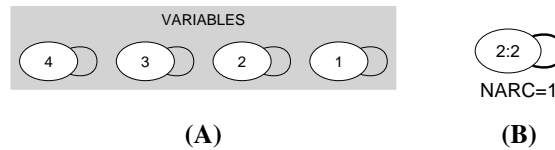


Figure 5.614: Initial and final graph of the `open_atmost` constraint