

5.300 open_maximum

	DESCRIPTION	LINKS	AUTOMATON
Origin	Derived from maximum		
Constraint	<code>open_maximum(MAX, VARIABLES)</code>		
Arguments	MAX : dvar VARIABLES : collection (var-dvar , bool-dvar)		
Restrictions	$ VARIABLES > 0$ required (VARIABLES, [var, bool]) $VARIABLES.bool \geq 0$ $VARIABLES.bool \leq 1$		
Purpose	MAX is the maximum value of the variables $VARIABLES[i].var$, ($1 \leq i \leq VARIABLES $) for which $VARIABLES[i].bool = 1$ (at least one of the Boolean variables is set to 1).		
Example	$\left(5, \left\langle \begin{array}{cc} \text{var} - 3 & \text{bool} - 1, \\ \text{var} - 1 & \text{bool} - 0, \\ \text{var} - 7 & \text{bool} - 0, \\ \text{var} - 5 & \text{bool} - 1, \\ \text{var} - 5 & \text{bool} - 1 \end{array} \right\rangle \right)$		
	The <code>open_maximum</code> constraint holds since its first argument $MAX = 5$ is set to the maximum value of values 3, 1, 7, 5, 5 for which the corresponding Boolean 1, 0, 0, 1, 1 is set to 1 (i.e., values 3, 5, 5).		
Typical	$ VARIABLES > 1$ range (VARIABLES.var) > 1		
Symmetries	<ul style="list-style-type: none"> • Items of VARIABLES are permutable. • One and the same constant can be added to MAX as well as to the <code>var</code> attribute of all items of VARIABLES. 		
See also	comparison swapped : open_minimum . hard version : maximum . used in graph description : in_set .		
Keywords	characteristic of a constraint : maximum , automaton , automaton without counters , reified automaton constraint . constraint network structure : centered cyclic(1) constraint network(1) . constraint type : order constraint , open constraint , open automaton constraint .		

Automaton

Figure 5.617 depicts the automaton associated with the `open_maximum` constraint. Let VAR_i, B_i be the i^{th} item of the `VARIABLES` collection. To each triple $(\text{MAX}, \text{VAR}_i, B_i)$ corresponds a signature variable S_i as well as the following signature constraint: $(B_i = 1 \wedge \text{MAX} < \text{VAR}_i \Leftrightarrow S_i = 0) \wedge (B_i = 1 \wedge \text{MAX} = \text{VAR}_i \Leftrightarrow S_i = 1) \wedge (B_i = 1 \wedge \text{MAX} > \text{VAR}_i \Leftrightarrow S_i = 2) \wedge (B_i = 0 \wedge \text{MAX} < \text{VAR}_i \Leftrightarrow S_i = 3) \wedge (B_i = 0 \wedge \text{MAX} = \text{VAR}_i \Leftrightarrow S_i = 4) \wedge (B_i = 0 \wedge \text{MAX} > \text{VAR}_i \Leftrightarrow S_i = 5)$.

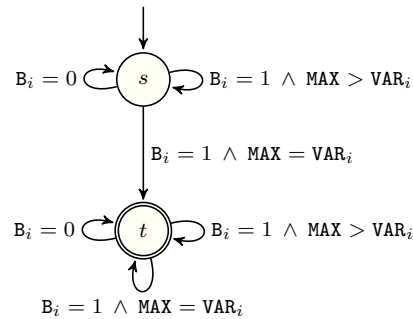


Figure 5.617: Automaton of the `open_maximum` constraint

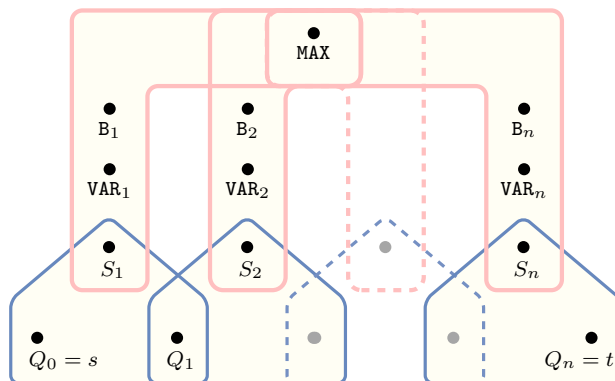


Figure 5.618: Hypergraph of the reformulation corresponding to the automaton of the `open_maximum` constraint