

5.213 min_index

	DESCRIPTION	LINKS	GRAPH
Origin	N. Beldiceanu		
Constraint	<code>min_index(MIN_INDEX, VARIABLES)</code>		
Arguments	MIN_INDEX : <code>dvar</code> VARIABLES : <code>collection(index-int, var-dvar)</code>		
Restrictions	$ VARIABLES > 0$ $MIN_INDEX \geq 0$ $MIN_INDEX \leq VARIABLES $ <code>required(VARIABLES, [index, var])</code> $VARIABLES.index \geq 1$ $VARIABLES.index \leq VARIABLES $ <code>distinct(VARIABLES, index)</code>		
Purpose	<div style="border: 1px solid pink; padding: 5px;"> MIN_INDEX is the index of the variables corresponding to the minimum value of the collection of variables VARIABLES. </div>		
Example	<div style="border: 1px solid blue; padding: 10px; display: inline-block;"> $\left(\begin{array}{l} \text{index} - 1 \quad \text{var} - 3, \\ \text{index} - 2 \quad \text{var} - 2, \\ 2, \left\langle \begin{array}{l} \text{index} - 3 \quad \text{var} - 7, \\ \text{index} - 4 \quad \text{var} - 2, \end{array} \right\rangle \\ \text{index} - 5 \quad \text{var} - 6 \end{array} \right)$ $\left(\begin{array}{l} \text{index} - 1 \quad \text{var} - 3, \\ 4, \left\langle \begin{array}{l} \text{index} - 2 \quad \text{var} - 2, \\ \text{index} - 3 \quad \text{var} - 7, \\ \text{index} - 4 \quad \text{var} - 2, \end{array} \right\rangle \\ \text{index} - 5 \quad \text{var} - 6 \end{array} \right)$ </div>		
	The attribute <code>var = 2</code> of the second and fourth items of the collection VARIABLES is the minimum value over values 3, 2, 7, 2, 6. Consequently, both <code>min_index</code> constraints hold since their first arguments MIN_INDEX are respectively set to 2 and 4.		
Symmetries	<ul style="list-style-type: none"> Items of VARIABLES are <code>permutable</code>. One and the same constant can be <code>added</code> to the <code>var</code> attribute of all items of VARIABLES. 		
Usage	Within the context of scheduling, assume the variables of the VARIABLES collection correspond to the starts of a set of tasks. Then MIN_INDEX gives the indexes of those tasks that can be scheduled first.		
See also	comparison swapped: max_index .		
Keywords	characteristic of a constraint: minimum . constraint type: order constraint .		

Arc input(s)	VARIABLES
Arc generator	$CLIQUE \mapsto collection(variables1, variables2)$
Arc arity	2
Arc constraint(s)	$\bigvee \left(\begin{array}{l} variables1.key = variables2.key, \\ variables1.var < variables2.var \end{array} \right)$
Graph property(ies)	$ORDER(0, 0, index) = MIN_INDEX$

Graph model

Parts (A) and (B) of Figure 5.410 respectively show the initial and final graph associated with the two examples of the **Example** slot. Since we use the **ORDER** graph property, the vertices of rank 0 (without considering the loops) of the final graph are outlined with a thick circle.

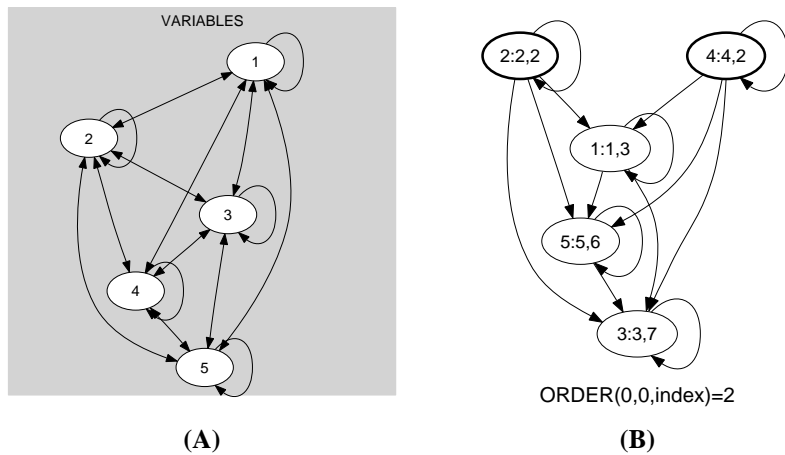


Figure 5.410: Initial and final graph of the `min_index` constraint