5.243 max_index

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Constraint   max_index(MAX_INDEX, VARIABLES)

Arguments   MAX_INDEX   : dvar
                      VARIABLES   : collection(index−int, var−dvar)

Restrictions |VARIABLES| > 0
                      MAX_INDEX ≥ 0
                      MAX_INDEX ≤ |VARIABLES|
                      required(VARIABLES, [index, var])
                      VARIABLES.index ≥ 1
                      VARIABLES.index ≤ |VARIABLES|
                      distinct(VARIABLES, index)

Purpose   MAX_INDEX is one of the indices of the collection of variables VARIABLES corresponding to its maximum value.

Example
$$\left(3, \left\langle \begin{array}{ll} \text{index} - 1 & \text{var} - 3, \\ \text{index} - 2 & \text{var} - 2, \\ \text{index} - 3 & \text{var} - 7, \\ \text{index} - 4 & \text{var} - 2, \\ \text{index} - 5 & \text{var} - 7 \end{array} \right\rangle \right)$$

The attribute var = 7 of the third and fifth items of the collection VARIABLES is the maximum value over values $3, 2, 7, 2, 7$. Consequently, the max_index constraint holds since its first argument MAX_INDEX is set to $3 \in \{3, 5\}$.

Typical |VARIABLES| > 0
                      range(VARIABLES.var) > 1

Symmetries   • Items of VARIABLES are permutable.

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

See also   **comparison swapped:** min_index.

Keywords   **characteristic of a constraint:** maximum.

                      constraint type: order constraint.

                      modelling: functional dependency.

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

Graph model Parts (A) and (B) of Figure 5.534 respectively show the initial and final graph associated with the **Example** slot. Since we use the **ORDER** graph property, the vertex of rank 0 (without considering the loops) of the final graph is outlined with a thick circle.
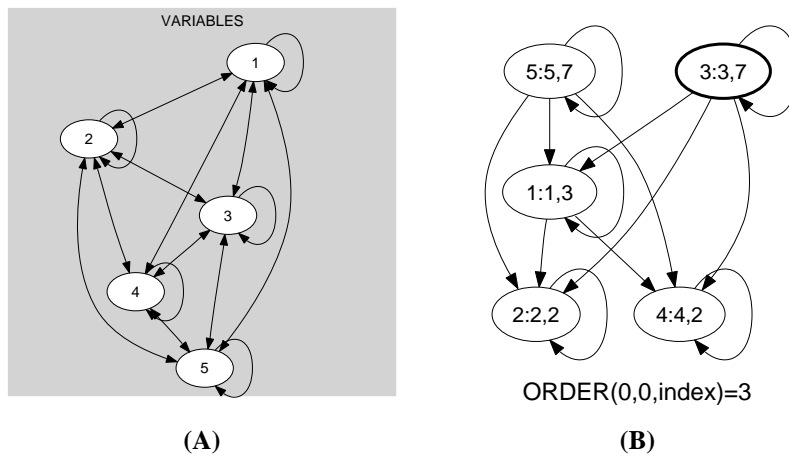

Figure 5.534: Initial and final graph of the max_index constraint