5.146 elements

DESCRIPTION LINKS GRAPH

Origin Derived from element.

Constraint elements(ITEMS, TABLE)

Arguments

ITEMS	:	collection(index−dvar, value−dvar)
TABLE	:	collection(index−int, value−dvar)

Restrictions

required(ITEMS, [index, value])
ITEMS.index ≥ 1
ITEMS.index ≤ |TABLE|
required(TABLE, [index, value])
TABLE.index ≥ 1
TABLE.index ≤ |TABLE|
distinct(TABLE, index)

Purpose All the items of ITEMS should be equal to one of the entries of the table TABLE.

Example

$$\left(\begin{array}{l} \langle \texttt{index} - 4\ \texttt{value} - 9, \texttt{index} - 1\ \texttt{value} - 6\rangle, \\ \left\langle \begin{array}{ll} \texttt{index} - 1 & \texttt{value} - 6, \\ \texttt{index} - 2 & \texttt{value} - 9, \\ \texttt{index} - 3 & \texttt{value} - 2, \\ \texttt{index} - 4 & \texttt{value} - 9 \end{array} \right\rangle \end{array}\right)$$

The elements constraint holds since each item of its first argument ITEMS corresponds to an item of the TABLE collection: the first item ⟨index − 4 value − 9⟩ of ITEMS corresponds to the fourth item of TABLE, while the second item ⟨index − 1 value − 6⟩ of ITEMS corresponds to the first item of TABLE.

Typical

|ITEMS| > 1
range(ITEMS.index) > 1
|TABLE| > 1
range(TABLE.value) > 1

Symmetries

- Items of ITEMS are permutable.
- Items of TABLE are permutable.
- All occurrences of two distinct values in ITEMS.value or TABLE.value can be swapped; all occurrences of a value in ITEMS.value or TABLE.value can be renamed to any unused value.

Arg. properties

Functional dependency: ITEMS.value determined by ITEMS.index and TABLE.

Usage Used for replacing several element constraints sharing exactly the same table by a single constraint.

Reformulation The elements($\langle$index $-$ I_1 value $-$ V_1, index $-$ I_2 value $-$ V_2, ..., index $-$ $I_{|\text{ITEMS}|}$ value $-$ $V_{|\text{ITEMS}|}\rangle$, TABLE) constraint can be expressed in term of a conjunction of |ITEMS| elem constraints of the form:
elem($\langle$index $-$ I_1 value $-$ $V_1\rangle$, TABLE),
elem($\langle$index $-$ I_2 value $-$ $V_2\rangle$, TABLE),
...
elem($\langle$index $-$ $I_{|\text{ITEMS}|}$ value $-$ $V_{|\text{ITEMS}|}\rangle$, TABLE).

See also **implied by:** elem, elements_alldifferent.
part of system of constraints: elem, element.

Keywords **constraint arguments:** pure functional dependency.
constraint type: data constraint, system of constraints.
filtering: arc-consistency.
modelling: table, shared table, functional dependency.

Cond. implications elements(ITEMS, TABLE)
with distinct(ITEMS, index)
and TABLE.value ≥ 0
implies bin_packing_capa(TABLE, ITEMS).

Arc input(s)	ITEMS TABLE
Arc generator	$PRODUCT \mapsto$ collection(items, table)
Arc arity	2
Arc constraint(s)	• items.index = table.index • items.value = table.value
Graph property(ies)	**NARC**= |ITEMS|

Graph model Parts (A) and (B) of Figure 5.337 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NARC** graph property, the arcs of the final graph are stressed in bold.

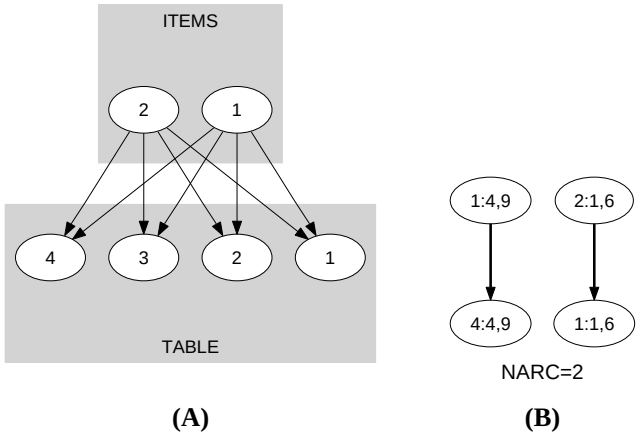

Figure 5.337: Initial and final graph of the elements constraint

Signature Since all the index attributes of TABLE collection are distinct and because of the first condition items.index = table.index of the arc constraint, a source vertex of the final graph can have at most one successor. Therefore |ITEMS| is the maximum number of arcs of the final graph and we can rewrite **NARC** = |ITEMS| to **NARC** $\geq$ |ITEMS|. So we can simplify $\overline{\mathbf{NARC}}$ to $\overline{\mathbf{NARC}}$.