

## 5.76 correspondence

	DESCRIPTION	LINKS	GRAPH
<b>Origin</b>	Derived from <code>sort_permutation</code> by removing the sorting condition.		
<b>Constraint</b>	<code>correspondence(FROM, PERMUTATION, TO)</code>		
<b>Arguments</b>	<pre>FROM      : collection(from-dvar) PERMUTATION : collection(var-dvar) TO        : collection(tvar-dvar)</pre>		
<b>Restrictions</b>	<pre> PERMUTATION  =  FROM   PERMUTATION  =  TO  PERMUTATION.var ≥ 1 PERMUTATION.var ≤  PERMUTATION  alldifferent(PERMUTATION) required(FROM, from) required(PERMUTATION, var) required(TO, tvar)</pre>		
<b>Purpose</b>	<p>The variables of collection FROM correspond to the variables of collection TO according to the permutation PERMUTATION (i.e., <math>\text{FROM}[i].\text{from} = \text{TO}[\text{PERMUTATION}[i].\text{var}].\text{tvar}</math>).</p>		

### Example

$$\left( \begin{array}{c} \text{from - 1,} \\ \text{from - 9,} \\ \langle \text{from - 1,} \\ \text{from - 5,} \rangle, \\ \text{from - 2,} \\ \text{from - 1} \\ \text{var - 6,} \\ \text{var - 1,} \\ \langle \text{var - 3,} \\ \text{var - 5,} \rangle, \\ \text{var - 4,} \\ \text{var - 2} \\ \text{tvar - 9,} \\ \text{tvar - 1,} \\ \langle \text{tvar - 1,} \\ \text{tvar - 2,} \rangle \\ \text{tvar - 5,} \\ \text{tvar - 1} \end{array} \right)$$

As illustrated by Figure 5.153, the correspondence constraint holds since:

- The first item  $\text{FROM}[1].\text{from} = 1$  of collection FROM corresponds to the  $\text{PERMUTATION}[1].\text{var} = 6^{\text{th}}$  item of collection TO.

- The second item  $\text{FROM}[2].\text{from} = 9$  of collection FROM corresponds to the  $\text{PERMUTATION}[2].\text{var} = 1^{\text{th}}$  item of collection TO.
- The third item  $\text{FROM}[3].\text{from} = 1$  of collection FROM corresponds to the  $\text{PERMUTATION}[3].\text{var} = 3^{\text{th}}$  item of collection TO.
- The fourth item  $\text{FROM}[4].\text{from} = 5$  of collection FROM corresponds to the  $\text{PERMUTATION}[4].\text{var} = 5^{\text{th}}$  item of collection TO.
- The fifth item  $\text{FROM}[5].\text{from} = 2$  of collection FROM corresponds to the  $\text{PERMUTATION}[5].\text{var} = 4^{\text{th}}$  item of collection TO.
- The sixth item  $\text{FROM}[6].\text{from} = 1$  of collection FROM corresponds to the  $\text{PERMUTATION}[6].\text{var} = 2^{\text{th}}$  item of collection TO.

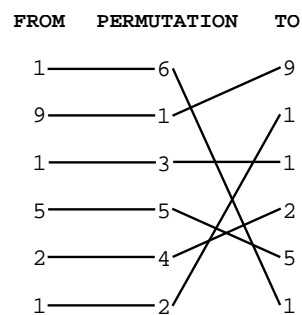


Figure 5.153: Illustration of the correspondence between the items of the FROM and the TO collections according to the permutation defined by the items of the PERMUTATION collection

<b>Typical</b>	<code> FROM  &gt; 1</code> <code>range(FROM.from) &gt; 1</code>
<b>Symmetry</b>	All occurrences of two distinct values in FROM.from or TO.tvar can be <a href="#">swapped</a> ; all occurrences of a value in FROM.from or TO.tvar can be <a href="#">renamed</a> to any unused value.
<b>Remark</b>	Similar to the <a href="#">same</a> constraint except that we also provide the permutation that allows to go from the items of collection FROM to the items of collection TO.
<b>See also</b>	<a href="#">implied by: sort_permutation.</a> <a href="#">specialisation: same</a> (PERMUTATION parameter removed).
<b>Keywords</b>	<a href="#">characteristic of a constraint:</a> derived collection. <a href="#">combinatorial object:</a> permutation. <a href="#">constraint arguments:</a> constraint between three collections of variables. <a href="#">final graph structure:</a> acyclic, bipartite, no loop.

**Derived Collection**

$$\text{col} \left( \begin{array}{l} \text{FROM\_PERMUTATION} - \text{collection}(\text{from-dvar}, \text{var-dvar}), \\ [\text{item}(\text{from} - \text{FROM.from}, \text{var} - \text{PERMUTATION.var})] \end{array} \right)$$
**Arc input(s)**

FROM\_PERMUTATION TO

**Arc generator***PRODUCT*  $\mapsto$  collection(from-permutation, to)**Arc arity**

2

**Arc constraint(s)**

- from-permutation.from = to.tvar
- from-permutation.var = to.key

**Graph property(ies)***NARC* = |PERMUTATION|**Graph class**

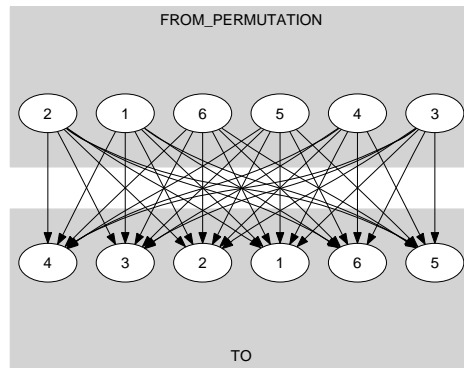
- ACYCLIC
- BIPARTITE
- NO\_LOOP

**Graph model**

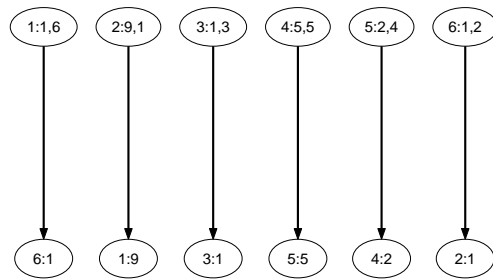
Parts (A) and (B) of Figure 5.154 respectively show the initial and final graph associated with the **Example** slot. In both graphs the source vertices correspond to the derived collection FROM\_PERMUTATION, while the sink vertices correspond to the collection TO. Since the final graph contains exactly |PERMUTATION| arcs the **correspondence** constraint holds. As we use the *NARC* graph property, the arcs of the final graph are stressed in bold.

**Signature**

Because of the second condition from-permutation.var = to.key of the arc constraint and since both, the var attributes of the collection FROM\_PERMUTATION and the key attributes of the collection TO are all-distinct, the final graph contains at most |PERMUTATION| arcs. Therefore we can rewrite the graph property *NARC* = |PERMUTATION| to *NARC*  $\geq$  |PERMUTATION|. This leads to simplify *NARC* to *NARC*.



(A)



(B)

NARC=6

Figure 5.154: Initial and final graph of the correspondence constraint