

## 5.177 `k_disjoint`

	DESCRIPTION	LINKS	GRAPH
<b>Origin</b>	Derived from <code>disjoint</code>		
<b>Constraint</b>	<code>k_disjoint(SETS)</code>		
<b>Type</b>	VARIABLES : <code>collection(var-dvar)</code>		
<b>Argument</b>	SETS : <code>collection(set - VARIABLES)</code>		
<b>Restrictions</b>	<code>required(VARIABLES, var)</code> $ \text{VARIABLES}  > 0$ <code>required(SETS, set)</code> $ \text{SETS}  > 1$		
<b>Purpose</b>	Given $ \text{SETS} $ sets of domain variables, the <code>k_disjoint</code> constraint enforces that no value is assigned to more than one set.		
<b>Example</b>	$\left( \begin{array}{c} \text{set} - \langle 1, 9, 1, 5 \rangle, \\ \text{var} - 2, \\ \text{var} - 7, \\ \langle \text{set} - \langle \text{var} - 7, \rangle, \rangle \\ \text{var} - 0, \\ \text{var} - 6, \\ \text{var} - 8 \\ \text{set} - \langle 4, 4, 3 \rangle \end{array} \right)$		
	The <code>k_disjoint</code> constraint holds since:		
	<ul style="list-style-type: none"> <li>• The set of values <math>\{1, 5, 9\}</math> and <math>\{0, 2, 6, 7, 8\}</math> respectively assigned to the variables of the first and second collections have an empty intersection.</li> <li>• The set of values <math>\{1, 5, 9\}</math> and <math>\{3, 4\}</math> respectively assigned to the variables of the first and third collections have an empty intersection.</li> <li>• The set of values <math>\{0, 2, 6, 7, 8\}</math> and <math>\{3, 4\}</math> respectively assigned to the variables of the second and third collections have an empty intersection.</li> </ul>		
<b>Typical</b>	$ \text{VARIABLES}  > 1$		
<b>Symmetries</b>	<ul style="list-style-type: none"> <li>• Items of SETS are <a href="#">permutable</a>.</li> <li>• Items of SETS.set are <a href="#">permutable</a>.</li> <li>• An occurrence of a value of VARIABLES.var can be <a href="#">replaced</a> by any value of VARIABLES.var.</li> <li>• All occurrences of two distinct values of SETS.set.var can be <a href="#">swapped</a>; all occurrences of a value of SETS.set.var can be <a href="#">renamed</a> to any unused value.</li> </ul>		

**See also**

**part of system of constraints:** disjoint.

**used in graph description:** disjoint.

**Keywords**

**characteristic of a constraint:** disequality.

**constraint type:** system of constraints, decomposition, value constraint.

**modelling:** empty intersection.

<b>Arc input(s)</b>	SETS
<b>Arc generator</b>	$\text{CLIQUE}(<) \mapsto \text{collection}(\text{set1}, \text{set2})$
<b>Arc arity</b>	2
<b>Arc constraint(s)</b>	$\text{disjoint}(\text{set1.set}, \text{set2.set})$
<b>Graph property(ies)</b>	$\text{NARC} =  \text{SETS}  * ( \text{SETS}  - 1) / 2$

**Graph model**

Parts (A) and (B) of Figure 5.359 respectively show the initial and final graph associated with the **Example** slot. To each vertex corresponds a collection of variables, while to each arc corresponds a **disjoint** constraint.

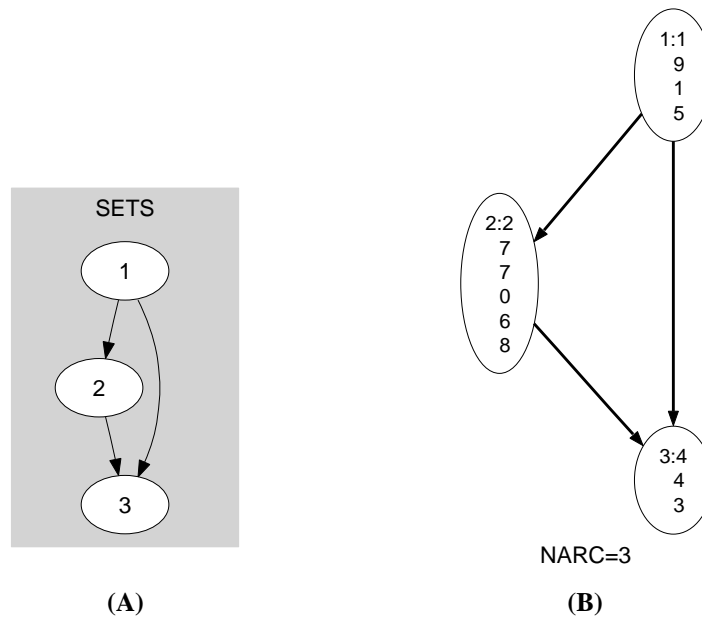


Figure 5.359: Initial and final graph of the  $k$ -disjoint constraint

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