

**5.364 soft\_same\_partition\_var**

	DESCRIPTION	LINKS	GRAPH
<b>Origin</b>	Derived from <code>same_partition</code>		
<b>Constraint</b>	<code>soft_same_partition_var(C, VARIABLES1, VARIABLES2, PARTITIONS)</code>		
<b>Synonym</b>	<code>soft_same_partition.</code>		
<b>Type</b>	VALUES : <code>collection(val-int)</code>		
<b>Arguments</b>	C : <code>dvar</code> VARIABLES1 : <code>collection(var-dvar)</code> VARIABLES2 : <code>collection(var-dvar)</code> PARTITIONS : <code>collection(p - VALUES)</code>		
<b>Restrictions</b>	$C \geq 0$ $C \leq  \text{VARIABLES1} $ $ \text{VARIABLES1}  =  \text{VARIABLES2} $ <code>required(VARIABLES1, var)</code> <code>required(VARIABLES2, var)</code> <code>required(PARTITIONS, p)</code> $ \text{PARTITIONS}  \geq 2$ $ \text{VALUES}  \geq 1$ <code>required(VALUES, val)</code> <code>distinct(VALUES, val)</code>		
<b>Purpose</b>	For each integer $i$ in $[1,  \text{PARTITIONS} ]$ , let $N1_i$ (respectively $N2_i$ ) denote the number of variables of <code>VARIABLES1</code> (respectively <code>VARIABLES2</code> ) that take their value in the $i^{\text{th}}$ partition of the collection <code>PARTITIONS</code> . $C$ is the minimum number of values to change in the <code>VARIABLES1</code> and <code>VARIABLES2</code> collections so that for all $i$ in $[1,  \text{PARTITIONS} ]$ we have $N1_i = N2_i$ .		
<b>Example</b>	$\left( \begin{array}{l} 4, \langle 9, 9, 9, 9, 9, 1 \rangle, \\ \langle 9, 1, 1, 1, 1, 8 \rangle, \\ \langle p - \langle 1, 2 \rangle, p - \langle 9 \rangle, p - \langle 7, 8 \rangle \end{array} \right)$ <p>In the example, the values of the collections <math>\langle 9, 9, 9, 9, 9, 1 \rangle</math> and <math>\langle 9, 1, 1, 1, 1, 8 \rangle</math> are respectively associated with the partitions <math>p - \langle 9 \rangle, p - \langle 9 \rangle, p - \langle 9 \rangle, p - \langle 9 \rangle, p - \langle 9 \rangle, p - \langle 1, 2 \rangle</math> and <math>p - \langle 9 \rangle, p - \langle 1, 2 \rangle, p - \langle 1, 2 \rangle, p - \langle 1, 2 \rangle, p - \langle 1, 2 \rangle, p - \langle 7, 8 \rangle</math>. Since there is a correspondence between two pairs of partitions we must unset at least <math>6 - 2</math> items (6 is the number of items of the <code>VARIABLES1</code> and <code>VARIABLES2</code> collections). Consequently, the <code>soft_same_partition_var</code> constraint holds since its first argument <math>C</math> is set to <math>6 - 2</math>.</p>		

**Typical**

```
C > 0
|VARIABLES1| > 1
range(VARIABLES1.var) > 1
range(VARIABLES2.var) > 1
|VARIABLES1| > |PARTITIONS|
|VARIABLES2| > |PARTITIONS|
```

**Symmetries**

- Arguments are [permutable](#) w.r.t. permutation (C) (VARIABLES1, VARIABLES2) (PARTITIONS).
- Items of VARIABLES1 are [permutable](#).
- Items of VARIABLES2 are [permutable](#).
- Items of PARTITIONS are [permutable](#).
- Items of PARTITIONS.p are [permutable](#).
- An occurrence of a value of VARIABLES1.var can be replaced by any other value that also belongs to the same partition of PARTITIONS.
- An occurrence of a value of VARIABLES2.var can be replaced by any other value that also belongs to the same partition of PARTITIONS.

**Usage**

A soft [same\\_partition](#) constraint.

**Algorithm**

See algorithm of the [soft\\_same\\_var](#) constraint.

**See also**

[hard version: same\\_partition](#).

[implies: soft\\_used\\_by\\_partition\\_var](#).

**Keywords**

**characteristic of a constraint:** [partition](#).

**constraint arguments:** [constraint between two collections of variables](#).

**constraint type:** [soft constraint, relaxation, variable-based violation measure](#).

<b>Arc input(s)</b>	VARIABLES1 VARIABLES2
<b>Arc generator</b>	<i>PRODUCT</i> $\mapsto$ <code>collection(variables1, variables2)</code>
<b>Arc arity</b>	2
<b>Arc constraint(s)</b>	<code>in_same_partition(variables1.var, variables2.var, PARTITIONS)</code>
<b>Graph property(ies)</b>	<u>NSINK_NSOURCE</u> = $ VARIABLES1  - C$

**Graph model**

Parts (A) and (B) of Figure 5.706 respectively show the initial and final graph associated with the **Example** slot. Since we use the NSINK\_NSOURCE graph property, the source and sink vertices of the final graph are stressed with a double circle. The `soft_same_partition_var` constraint holds since the cost 4 corresponds to the difference between the number of variables of `VARIABLES1` and the sum over the different connected components of the minimum number of sources and sinks.

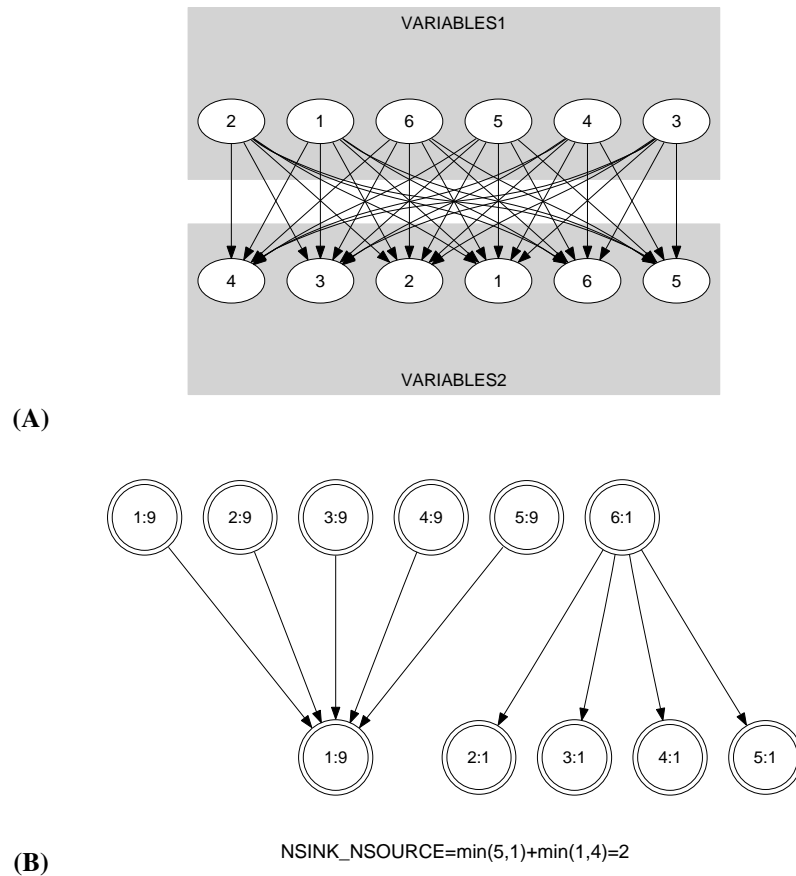


Figure 5.706: Initial and final graph of the `soft_same_partition_var` constraint

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