5.215 k_used_by_partition

DESCRIPTION LINKS GRAPH

Origin Derived from used_by_partition and from k_used_by.

Constraint k_used_by_partition(SETS, PARTITIONS)

Types

VARIABLES	:	collection(var−dvar)
VALUES	:	collection(val−int)

Arguments

SETS	:	collection(set − VARIABLES)
PARTITIONS	:	collection(p − VALUES)

Restrictions

required(VARIABLES, var)
|VARIABLES| ≥ 1
|VALUES| ≥ 1
required(VALUES, val)
distinct(VALUES, val)
required(SETS, set)
|SETS| > 1
non_increasing_size(SETS, set)
required(PARTITIONS, p)
|PARTITIONS| ≥ 2

Purpose Given |SETS| sets of domain variables, the k_used_by_partition constraint forces a used_by_partition constraint between each pair of consecutive sets.

Example $\left(\begin{array}{l} \langle \mathtt{set} - \langle 1,9,1,6,2,3 \rangle, \mathtt{set} - \langle 1,3,6,6 \rangle, \mathtt{set} - \langle 2,2 \rangle \rangle, \\ \langle \mathtt{p} - \langle 1,3 \rangle, \mathtt{p} - \langle 4 \rangle, \mathtt{p} - \langle 2,6 \rangle \rangle \end{array} \right)$

The k_used_by_partition constraint holds since:

- The first collection of variables is assigned 3 values in $\{1,3\}$, 0 value in $\{4\}$ and 2 values in $\{2,6\}$, while the second collection of variables is assigned no more values in the previous three sets of values.
- The second collection of variables is assigned 2 values in $\{1,3\}$, 0 value in $\{4\}$ and 2 values in $\{2,6\}$, while the third collection of variables is assigned no more values in the previous three sets of values.

Typical |VARIABLES| > 1

Symmetries

- Items of SETS are permutable.
- Items of SETS.set are permutable.
- Items of PARTITIONS are permutable.
- Items of PARTITIONS.p are permutable.
- An occurrence of a value of SETS.set.var can be replaced by any other value that also belongs to the same partition of PARTITIONS.

Arg. properties

Contractible wrt. SETS.

See also

common keyword: k_used_by *(system of constraints)*.

implied by: k_same_partition.

part of system of constraints: used_by_partition.

used in graph description: used_by_partition.

Keywords

characteristic of a constraint: partition, sort based reformulation.

constraint type: system of constraints, decomposition.

Arc input(s)	SETS
Arc generator	$PATH \mapsto$ collection(set1, set2)
Arc arity	2
Arc constraint(s)	used_by_partition(set1.set, set2.set, PARTITIONS)
Graph property(ies)	NARC$= \lvert$SETS$\rvert - 1$

Graph model Parts (A) and (B) of Figure 5.487 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 used_by_partition constraint.

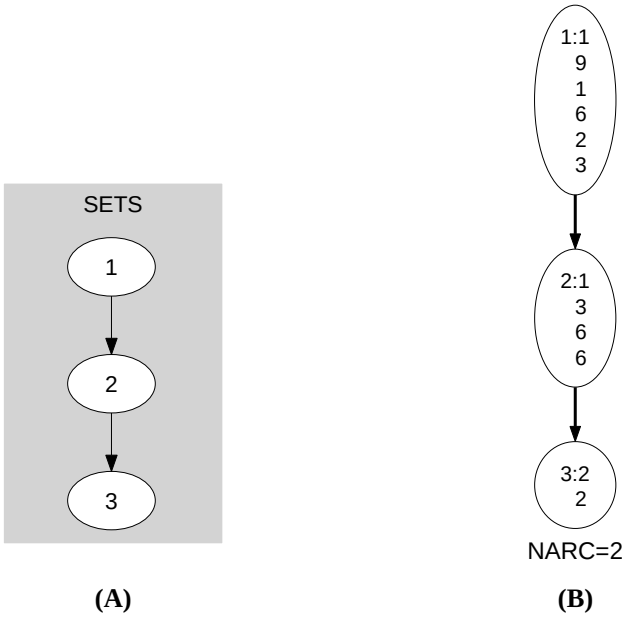

Figure 5.487: Initial and final graph of the k_used_by_partition constraint