5.60 cardinality_atmost_partition

DESCRIPTION LINKS GRAPH

Origin Derived from global_cardinality.

Constraint cardinality_atmost_partition(ATMOST, VARIABLES, PARTITIONS)

Type
```
VALUES : collection(val−int)
```

Arguments

ATMOST	:	dvar
VARIABLES	:	collection(var−dvar)
PARTITIONS	:	collection(p − VALUES)

Restrictions
- $|\texttt{VALUES}| \geq 1$
- required(VALUES, val)
- distinct(VALUES, val)
- $\texttt{ATMOST} \geq 0$
- $\texttt{ATMOST} \leq |\texttt{VARIABLES}|$
- required(VARIABLES, var)
- required(PARTITIONS, p)
- $|\texttt{PARTITIONS}| \geq 2$

Purpose ATMOST is the maximum number of time that values of a same partition of PARTITIONS are taken by the variables of the collection VARIABLES.

Example $(2, \langle 2, 3, 7, 1, 6, 0\rangle, \langle \texttt{p} - \langle 1, 3\rangle, \texttt{p} - \langle 4\rangle, \texttt{p} - \langle 2, 6\rangle\rangle)$

In this example, two variables of the collection $\texttt{VARIABLES} = \langle 2, 3, 7, 1, 6, 0\rangle$ are assigned values of the first partition, no variable is assigned a value of the second partition, and finally two variables are assigned values of the last partition. As a consequence, the cardinality_atmost_partition constraint holds since its first argument ATMOST is assigned to the maximum number of occurrences 2.

Typical
- $\texttt{ATMOST} > 0$
- $\texttt{ATMOST} < |\texttt{VARIABLES}|$
- $|\texttt{VARIABLES}| > 1$
- $|\texttt{VARIABLES}| > |\texttt{PARTITIONS}|$

Symmetries
- Items of VARIABLES are permutable.
- Items of PARTITIONS are permutable.
- Items of PARTITIONS.p are permutable.

Arg. properties Functional dependency: ATMOST determined by VARIABLES and PARTITIONS.

See also

generalisation: `global_cardinality` *(single* `count` `variable` *replaced by an individual* `count` `variable` *for each value and* `variable` *replaced by* `variable` $\in$ `partition`*)*.

used in graph description: `in`.

Keywords

characteristic of a constraint: partition.

constraint arguments: pure functional dependency.

constraint type: value constraint.

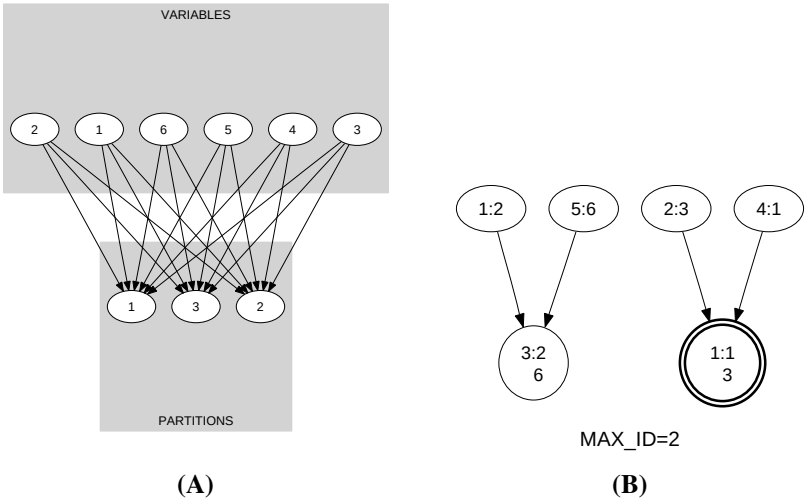
filtering: arc-consistency.

final graph structure: acyclic, bipartite, no loop.

modelling: at most, functional dependency.

Arc input(s)	VARIABLES PARTITIONS
Arc generator	$PRODUCT \mapsto$ collection(variables, partitions)
Arc arity	2
Arc constraint(s)	in(variables.var, partitions.p)
Graph property(ies)	MAX_ID= ATMOST
Graph class	• ACYCLIC • BIPARTITE • NO_LOOP

Graph model Parts (A) and (B) of Figure 5.135 respectively show the initial and final graph associated with the **Example** slot. Since we use the MAX_ID graph property, a vertex with the maximum number of predecessor is stressed with a double circle.



(A) **(B)**

Figure 5.135: Initial and final graph of the cardinality_atmost_partition constraint