

## 5.48 cardinality\_atmost\_partition

	DESCRIPTION	LINKS	GRAPH
<b>Origin</b>	Derived from <code>global_cardinality</code> .		
<b>Constraint</b>	<code>cardinality_atmost_partition(ATMOST, VARIABLES, PARTITIONS)</code>		
<b>Type</b>	VALUES : <code>collection(val-int)</code>		
<b>Arguments</b>	ATMOST : <code>dvar</code> VARIABLES : <code>collection(var-dvar)</code> PARTITIONS : <code>collection(p - VALUES)</code>		
<b>Restrictions</b>	$ VALUES  \geq 1$ <code>required(VALUES, val)</code> <code>distinct(VALUES, val)</code> $ATMOST \geq 0$ $ATMOST \leq  VARIABLES $ <code>required(VARIABLES, var)</code> <code>required(PARTITIONS, p)</code> $ PARTITIONS  \geq 2$		
<b>Purpose</b>	<div style="border: 1px solid pink; padding: 5px;">           ATMOST is the maximum number of time that values of a same partition of PARTITIONS are taken by the variables of the collection VARIABLES.         </div>		
<b>Example</b>	<div style="border: 1px solid blue; padding: 10px; display: inline-block;"> <math display="block">\left( \begin{array}{c} \text{var} - 2, \\ \text{var} - 3, \\ 2, \left\langle \begin{array}{c} \text{var} - 7, \\ \text{var} - 1, \end{array} \right\rangle, \\ \text{var} - 6, \\ \text{var} - 0 \\ \left\langle \begin{array}{c} p - \langle 1, 3 \rangle, \\ p - \langle 4 \rangle, \\ p - \langle 2, 6 \rangle \end{array} \right\rangle \end{array} \right)</math> </div>		
	In this example, two variables of the collection <code>VARIABLES = &lt;2, 3, 7, 1, 6, 0&gt;</code> 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 <code>cardinality_atmost_partition</code> constraint holds since its first argument ATMOST is assigned to the maximum number of occurrences 2.		
<b>Typical</b>	$ATMOST > 0$ $ATMOST <  VARIABLES $ $ VARIABLES  > 1$ $ VARIABLES  >  PARTITIONS $		

**Symmetries**

- Items of VARIABLES are [permutable](#).
- Items of PARTITIONS are [permutable](#).
- Items of PARTITIONS.p are [permutable](#).

**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 type:** [value constraint](#).

**filtering:** [arc-consistency](#).

**final graph structure:** [acyclic](#), [bipartite](#), [no loop](#).

**modelling:** [at most](#).

<b>Arc input(s)</b>	VARIABLES PARTITIONS
<b>Arc generator</b>	<i>PRODUCT</i> $\mapsto$ collection(variables, partitions)
<b>Arc arity</b>	2
<b>Arc constraint(s)</b>	in(variables.var, partitions.p)
<b>Graph property(ies)</b>	<b>MAX_ID</b> = ATMOST
<b>Graph class</b>	<ul style="list-style-type: none"> <li>• ACYCLIC</li> <li>• BIPARTITE</li> <li>• NO_LOOP</li> </ul>

**Graph model**

Parts (A) and (B) of Figure 5.90 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.

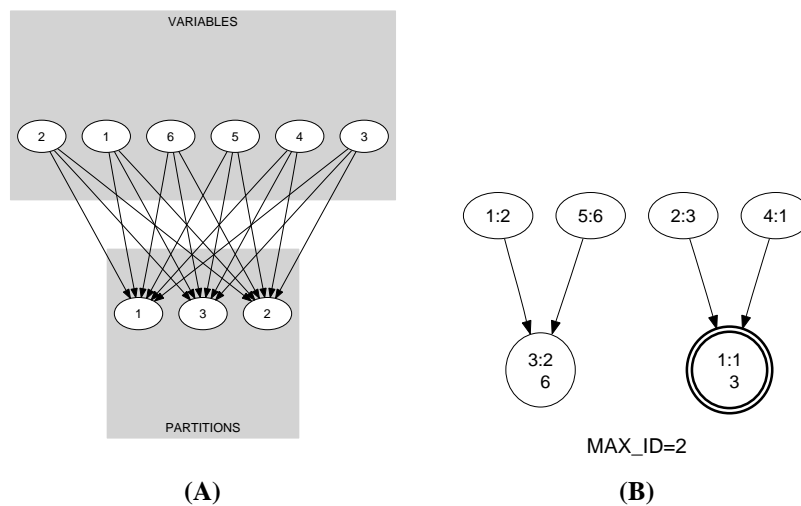


Figure 5.90: Initial and final graph of the cardinality\_atmost\_partition constraint

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