5.327 product_ctr

DESCRIPTION LINKS GRAPH

Origin

Arithmetic constraint.

Constraint

$\mathtt{product\_ctr}(\mathtt{VARIABLES}, \mathtt{CTR}, \mathtt{VAR})$

Arguments

VARIABLES	:	collection(var−dvar)
CTR	:	atom
VAR	:	dvar

Restrictions

$\mathtt{required}(\mathtt{VARIABLES}, \mathtt{var})$
$\mathtt{CTR} \in [=, \neq, <, \geq, >, \leq]$

Purpose

Constraint the product of a set of domain variables. More precisely, let P denote the product of the variables of the VARIABLES collection. Enforce the following constraint to hold: P CTR VAR.

Example

$$(\langle 2, 1, 4\rangle, =, 8)$$

The product_ctr constraint holds since its last argument $\mathtt{VAR} = 8$ is equal (i.e., CTR is set to $=$) to $2 \cdot 1 \cdot 4$.

Typical

$|\mathtt{VARIABLES}| > 1$
$|\mathtt{VARIABLES}| < 10$
$\mathtt{range}(\mathtt{VARIABLES.var}) > 1$
$\mathtt{VARIABLES.var} \neq 0$
$\mathtt{CTR} \in [=, <, \geq, >, \leq]$
$\mathtt{VAR} \neq 0$

Symmetry

Items of VARIABLES are permutable.

Arg. properties

- Contractible wrt. VARIABLES when $\mathtt{CTR} \in [<, \leq]$ and $\mathtt{minval}(\mathtt{VARIABLES.var}) > 0$.
- Aggregate: VARIABLES(union), CTR(id), VAR($*$) when $\mathtt{CTR} \in [=]$.

Used in

cumulative_product.

See also

common keyword: range_ctr, sum_ctr *(arithmetic constraint)*.

Keywords

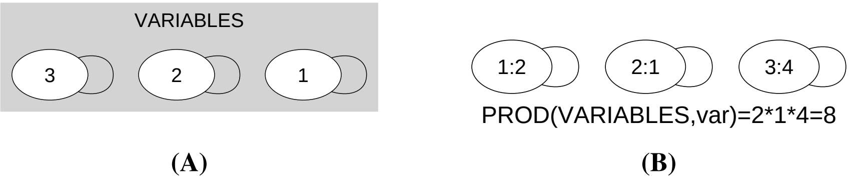
characteristic of a constraint: product.

constraint type: arithmetic constraint.

Arc input(s)	VARIABLES
Arc generator	$SELF$↦collection(variables)
Arc arity	1
Arc constraint(s)	TRUE
Graph property(ies)	**PROD**(VARIABLES, var) CTR VAR

Graph model Since we want to keep all the vertices of the initial graph we use the $SELF$ arc generator together with the TRUE arc constraint. This predefined arc constraint always holds.

Parts (A) and (B) of Figure 5.657 respectively show the initial and final graph associated with the **Example** slot. Since we use the TRUE arc constraint both graphs are identical.



(A) **(B)**

Figure 5.657: Initial and final graph of the product_ctr constraint