5.331 range_ctr

DESCRIPTION LINKS GRAPH

Origin Arithmetic constraint.

Constraint range_ctr(VARIABLES, CTR, R)

Arguments

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

Restrictions

|VARIABLES| > 0
required(VARIABLES, var)
CTR ∈ [=, ≠, <, ≥, >, ≤]

Purpose Constraint the difference between the maximum value and the minimum value of a set of domain variables. More precisely, let RANGE denote the difference between the largest and the smallest variables of the VARIABLES collection plus one. Enforce the following constraint to hold: RANGE CTR R.

Example $(\langle 1, 9, 4\rangle, =, 9)$

The range_ctr constraint holds since $\max(1, 9, 4) - \min(1, 9, 4) + 1$ is equal (i.e., CTR is set to $=$) to its last argument $R = 9$.

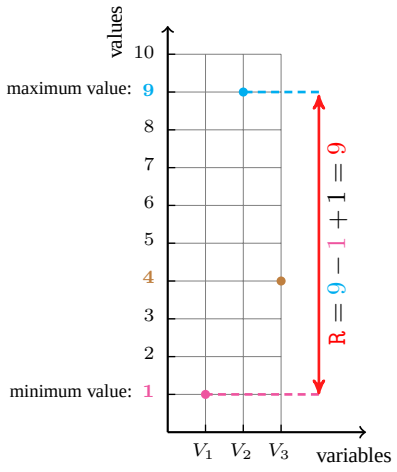

Figure 5.678: Illustration of the **Example** slot: three variables respectively fixed to values 1, 9 and 4, and their corresponding range $R = 9$

Typical

$|\texttt{VARIABLES}| > 1$
$\texttt{range}(\texttt{VARIABLES.var}) > 1$
$\texttt{CTR} \in [=, <, \geq, >, \leq]$

Symmetries

- Items of `VARIABLES` are permutable.
- All occurrences of two distinct values of `VARIABLES.var` can be swapped.
- One and the same constant can be added to the `var` attribute of all items of `VARIABLES`.

Arg. properties

- Contractible wrt. `VARIABLES` when $\texttt{CTR} \in [<, \leq]$.
- Extensible wrt. `VARIABLES` when $\texttt{CTR} \in [\geq, >]$.

Used in `shift`.

See also **common keyword:** `product_ctr`, `sum_ctr` *(arithmetic constraint)*.

Keywords **characteristic of a constraint:** range.
constraint type: arithmetic constraint.

Arc input(s)	VARIABLES
Arc generator	$SELF \mapsto$ collection(variables)
Arc arity	1
Arc constraint(s)	TRUE
Graph property(ies)	RANGE(VARIABLES, var) CTR R

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 5.679 respectively show the initial and final graph associated with the **Example** slot. Since we use the TRUE arc constraint both graphs are identical.

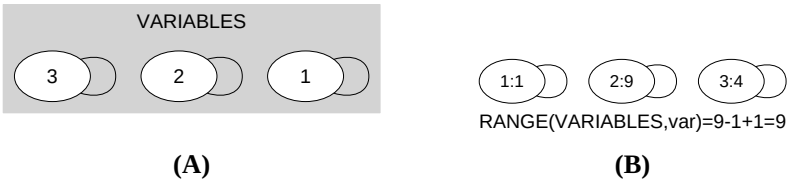

Figure 5.679: Initial and final graph of the range_ctr constraint