

### 5.330 range\_ctr

	DESCRIPTION	LINKS	GRAPH
<b>Origin</b>	Arithmetic constraint.		
<b>Constraint</b>	<code>range_ctr(VARIABLES, CTR, R)</code>		
<b>Arguments</b>	VARIABLES : <code>collection(var-dvar)</code> CTR : <code>atom</code> R : <code>dvar</code>		
<b>Restrictions</b>	$ VARIABLES  > 0$ <code>required(VARIABLES, var)</code> $CTR \in [=, \neq, <, \geq, >, \leq]$		
<b>Purpose</b>	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.		
<b>Example</b>	$((1, 9, 4), =, 9)$		

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  $R = 9$ .

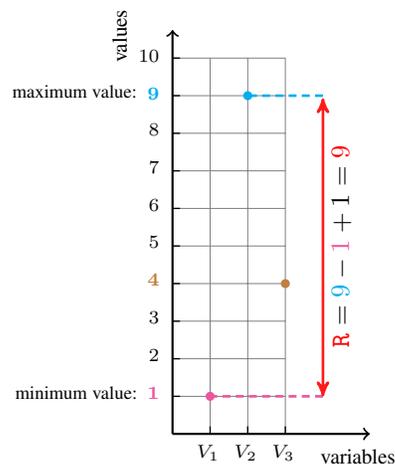


Figure 5.659: Illustration of the **Example** slot: three variables respectively fixed to values 1, 9 and 4, and their corresponding range  $R = 9$

**Typical**

```
|VARIABLES| > 1  
range(VARIABLES.var) > 1  
CTR ∈ [=, <, ≥, >, ≤]
```

**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  $CTR ∈ [ <, ≤ ]$ .
- [Extensible](#) wrt. VARIABLES when  $CTR ∈ [ ≥, > ]$ .

**Used in**

[shift](#).

**See also**

**common keyword:** [product\\_ctr](#), [sum\\_ctr](#) (*arithmetic constraint*).

**Keywords**

**characteristic of a constraint:** [range](#).

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

<b>Arc input(s)</b>	VARIABLES
<b>Arc generator</b>	<i>SELF</i> $\mapsto$ collection(variables)
<b>Arc arity</b>	1
<b>Arc constraint(s)</b>	TRUE
<b>Graph property(ies)</b>	<u>RANGE</u> (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 5.660 respectively show the initial and final graph associated with the **Example** slot. Since we use the TRUE arc constraint both graphs are identical.

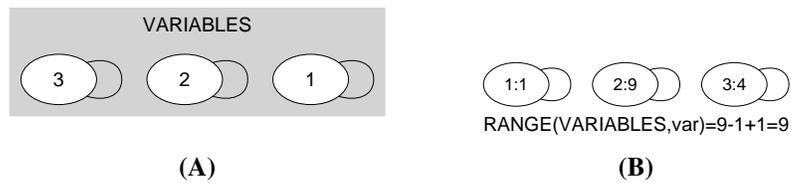


Figure 5.660: Initial and final graph of the range\_ctr constraint

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