

5.152 equal_sboxes

	DESCRIPTION	LINKS	LOGIC
Origin	Geometry, derived from [338]		
Constraint	equal_sboxes(K, DIMS, OBJECTS, SBOXES)		
Synonym	equal.		
Types	VARIABLES : collection(v-dvar) INTEGERS : collection(v-int) POSITIVES : collection(v-int)		
Arguments	K : int DIMS : sint OBJECTS : collection(oid-int, sid-dvar, x - VARIABLES) SBOXES : collection(sid-int, t - INTEGERS, l - POSITIVES)		
Restrictions	$ VARIABLES \geq 1$ $ INTEGERS \geq 1$ $ POSITIVES \geq 1$ required(VARIABLES, v) $ VARIABLES = K$ required(INTEGERS, v) $ INTEGERS = K$ required(POSITIVES, v) $ POSITIVES = K$ $POSITIVES.v > 0$ $K > 0$ $DIMS \geq 0$ $DIMS < K$ increasing-seq(OBJECTS, [oid]) required(OBJECTS, [oid, sid, x]) $OBJECTS.oid \geq 1$ $OBJECTS.oid \leq OBJECTS $ $OBJECTS.sid \geq 1$ $OBJECTS.sid \leq SBOXES $ $ SBOXES \geq 1$ required(SBOXES, [sid, t, l]) $SBOXES.sid \geq 1$ $SBOXES.sid \leq SBOXES $ do_not_overlap(SBOXES)		

Purpose

Holds if, for each pair of objects (O_i, O_j) , $i \neq j$, O_i and O_j coincide exactly with respect to a set of dimensions depicted by DIMS. O_i and O_j are objects that take a shape among a set of shapes. Each *shape* is defined as a finite set of shifted boxes, where each shifted box is described by a box in a K-dimensional space at a given offset (from the origin of the shape) with given sizes. More precisely, a *shifted box* is an entity defined by its shape id `sid`, shift offset `t`, and sizes `l`. Then, a shape is defined as the union of shifted boxes sharing the same shape id. An *object* is an entity defined by its unique object identifier `oid`, shape id `sid` and origin `x`.

Two objects O_i and object O_j are *equal* with respect to a set of dimensions depicted by DIMS if and only if, for all shifted box s_i associated with O_i there exists a shifted box s_j such that, for all dimensions $d \in \text{DIMS}$, (1) the origins of s_i and s_j coincide and, (2) the ends of s_i and s_j also coincide.

Example

$$\left(\begin{array}{l} 2, \{0, 1\}, \\ \left\langle \begin{array}{l} \text{oid} - 1 \quad \text{sid} - 2 \quad \text{x} - \langle 4, 1 \rangle, \\ \text{oid} - 2 \quad \text{sid} - 2 \quad \text{x} - \langle 4, 1 \rangle, \\ \text{oid} - 3 \quad \text{sid} - 2 \quad \text{x} - \langle 4, 1 \rangle \end{array} \right\rangle, \\ \text{sid} - 1 \quad \text{t} - \langle 0, 0 \rangle \quad \text{l} - \langle 1, 2 \rangle, \\ \text{sid} - 2 \quad \text{t} - \langle 0, 0 \rangle \quad \text{l} - \langle 1, 1 \rangle, \\ \text{sid} - 2 \quad \text{t} - \langle 1, 0 \rangle \quad \text{l} - \langle 1, 3 \rangle, \\ \left\langle \begin{array}{l} \text{sid} - 2 \quad \text{t} - \langle 0, 2 \rangle \quad \text{l} - \langle 1, 1 \rangle, \\ \text{sid} - 3 \quad \text{t} - \langle 0, 0 \rangle \quad \text{l} - \langle 3, 1 \rangle, \\ \text{sid} - 3 \quad \text{t} - \langle 0, 1 \rangle \quad \text{l} - \langle 1, 1 \rangle, \\ \text{sid} - 3 \quad \text{t} - \langle 2, 1 \rangle \quad \text{l} - \langle 1, 1 \rangle, \\ \text{sid} - 4 \quad \text{t} - \langle 0, 0 \rangle \quad \text{l} - \langle 1, 1 \rangle \end{array} \right\rangle \end{array} \right)$$

Figure 5.325 shows the objects of the example. Since these objects coincide exactly the `equal_sboxes` constraint holds.

Typical

`|OBJECTS| > 1`

Symmetries

- Items of OBJECTS are [permutable](#).
- Items of SBOXES are [permutable](#).
- Items of OBJECTS.x, SBOXES.t and SBOXES.l are [permutable](#) (*same permutation used*).

Arg. properties

[Suffix-contractible](#) wrt. OBJECTS.

Remark

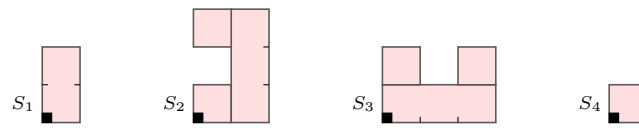
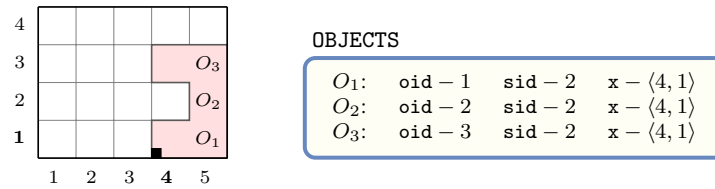
One of the eight relations of the [Region Connection Calculus](#) [338]. The constraint `equal_sboxes` is a restriction of the original relation since it requires to have exactly the same partition between the different objects.

See also

common keyword: [contains_sboxes](#), [coveredby_sboxes](#), [covers_sboxes](#), [disjoint_sboxes](#), [inside_sboxes](#), [meet_sboxes](#) (*rcc8*), [non_overlap_sboxes](#) (*geometrical constraint, logic*), [overlap_sboxes](#) (*rcc8*).

Keywords

constraint type: [logic](#).

(A) Possible shapes S_1, S_2, S_3 and S_4 

(B) Three objects which exactly coincide

Figure 5.325: (B) The three mutually coinciding objects O_1, O_2, O_3 of the **Example** slot respectively assigned shape S_2 ; (A) shapes S_1, S_2, S_3 and S_4 are respectively made up from 1, 3, 3 and 1 disjoint shifted box.

geometry: geometrical constraint, rcc8.

miscellaneous: obscure.

Logic

- $\text{origin}(O1, S1, D) \stackrel{\text{def}}{=} O1.x(D) + S1.t(D)$
- $\text{end}(O1, S1, D) \stackrel{\text{def}}{=} O1.x(D) + S1.t(D) + S1.l(D)$
- $\text{equal_sboxes}(\text{Dims}, O1, S1, O2, S2) \stackrel{\text{def}}{=} \forall D \in \text{Dims} \wedge \left(\begin{array}{l} \text{origin}(O1, S1, D) = \\ \text{origin}(O2, S2, D) \\ \text{end}(O1, S1, D) = \\ \text{end}(O2, S2, D) \end{array} \right)$
- $\text{equal_objects}(\text{Dims}, O1, O2) \stackrel{\text{def}}{=} \forall S1 \in \text{sboxes}([O1.\text{sid}]) \exists S2 \in \text{sboxes}([O2.\text{sid}]) \text{equal_sboxes} \left(\begin{array}{l} \text{Dims}, \\ O1, \\ S1, \\ O2, \\ S2 \end{array} \right)$
- $\text{all_equal}(\text{Dims}, \text{OIDS}) \stackrel{\text{def}}{=} \forall O1 \in \text{objects}(\text{OIDS}) \forall O2 \in \text{objects}(\text{OIDS}) O1.\text{oid} = O2.\text{oid} - 1 \text{equal_objects} \left(\begin{array}{l} \text{Dims}, \\ O1, \\ O2 \end{array} \right)$
- $\text{all_equal}(\text{DIMENSIONS}, \text{OIDS})$