

5.71 connect_points

	DESCRIPTION	LINKS	GRAPH
Origin	N. Beldiceanu		
Constraint	<code>connect_points(SIZE1, SIZE2, SIZE3, NGROUP, POINTS)</code>		
Arguments	<pre> SIZE1 : int SIZE2 : int SIZE3 : int NGROUP : dvar POINTS : collection(p-dvar) </pre>		
Restrictions	<pre> SIZE1 > 0 SIZE2 > 0 SIZE3 > 0 NGROUP ≥ 0 NGROUP ≤ POINTS SIZE1 * SIZE2 * SIZE3 = POINTS required(POINTS, p) </pre>		
Purpose	<div style="border: 1px solid pink; padding: 5px;"> <p>On a 3-dimensional grid of variables, number of groups, where a group consists of a connected set of variables that all have a same value distinct from 0.</p> </div>		

Example

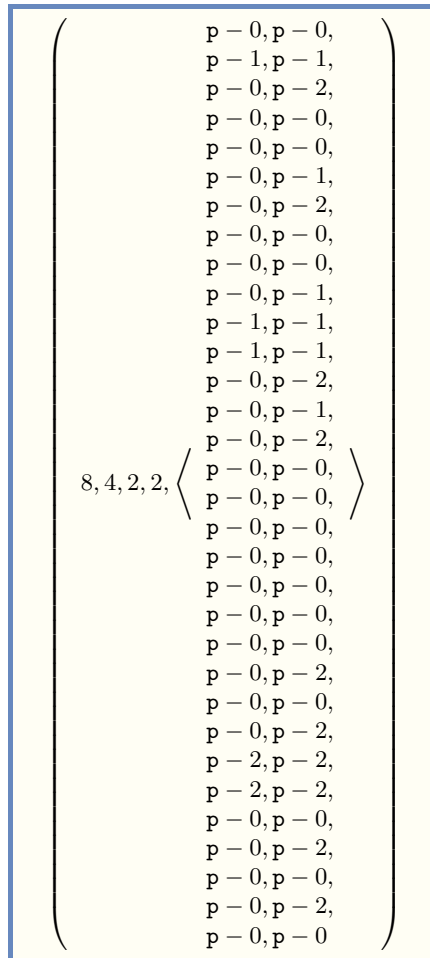


Figure 5.147 corresponds to the solution where we describe separately each layer of the grid. The connect_points constraint holds since we have two groups (NGROUP = 2): a first one for the variables of the POINTS collection assigned to value 1, and a second one for the variables assigned to value 2.

0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	2	0	0	0	0	0	0	0	2	0	0
0	0	0	1	1	1	1	1	0	2	2	2	2	2	0	0
0	2	0	1	0	2	0	0	0	2	0	0	0	2	0	0

Figure 5.147: The two layers of the solution

Typical

```
SIZE1 > 1  
SIZE2 > 1  
NGROUP > 0  
NGROUP < |POINTS|  
|POINTS| > 3
```

Symmetry

All occurrences of two distinct values of POINTS.p that are both different from 0 can be [swapped](#); all occurrences of a value of POINTS.p that is different from 0 can be [renamed](#) to any unused value that is also different from 0.

Usage

Wiring problems [348], [410].

Keywords

characteristic of a constraint: joker value.

final graph structure: strongly connected component, symmetric.

geometry: geometrical constraint.

problems: channel routing.

Arc input(s)	POINTS
Arc generator	<i>GRID</i> ([SIZE1, SIZE2, SIZE3]) \mapsto <i>collection</i> (points1, points2)
Arc arity	2
Arc constraint(s)	<ul style="list-style-type: none"> • points1.p \neq 0 • points1.p = points2.p
Graph property(ies)	<i>NSCC</i> = NGROUP
Graph class	<i>SYMMETRIC</i>

Graph model

Figure 5.148 gives the initial graph constructed by the *GRID* arc generator associated with the **Example** slot.

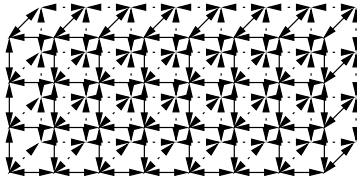


Figure 5.148: Graph generated by *GRID*([8 , 4 , 2])