

5.228 lex_different

	DESCRIPTION	LINKS	GRAPH	AUTOMATON
Origin	Used for defining <code>lex_alldifferent</code> .			
Constraint	<code>lex_different(VECTOR1, VECTOR2)</code>			
Synonyms	different, diff.			
Arguments	VECTOR1 : <code>collection(var-dvar)</code> VECTOR2 : <code>collection(var-dvar)</code>			
Restrictions	<code>required(VECTOR1, var)</code> <code>required(VECTOR2, var)</code> $ \text{VECTOR1} > 0$ $ \text{VECTOR1} = \text{VECTOR2} $			
Purpose	Vectors VECTOR1 and VECTOR2 differ in at least one component.			
Example	$(\langle 5, 2, 7, 1 \rangle, \langle 5, 3, 7, 1 \rangle)$ The <code>lex_different</code> constraint holds since $\text{VECTOR1} = \langle 5, 2, 7, 1 \rangle$ and $\text{VECTOR2} = \langle 5, 3, 7, 1 \rangle$ differ in their second component.			
Typical	$ \text{VECTOR1} > 1$ <code>range(VECTOR1.var) > 1</code> <code>range(VECTOR2.var) > 1</code>			
Symmetries	<ul style="list-style-type: none"> Arguments are <code>permutable</code> w.r.t. permutation $(\text{VECTOR1}, \text{VECTOR2})$. Items of VECTOR1 and VECTOR2 are <code>permutable</code> (<i>same permutation used</i>). 			
Arg. properties	<code>Extensible</code> wrt. VECTOR1 and VECTOR2 (<i>add items at same position</i>).			
Reformulation	The <code>lex_different</code> ($\langle \text{var} - U_1, \text{var} - U_2, \dots, \text{var} - U_{ \text{VECTOR1} } \rangle, \langle \text{var} - V_1, \text{var} - V_2, \dots, \text{var} - V_{ \text{VECTOR2} } \rangle$) constraint can be expressed in term of the following disjunction of disequality constraints $U_1 \neq V_1 \vee U_2 \neq V_2 \vee \dots \vee U_{ \text{VECTOR1} } \neq V_{ \text{VECTOR2} }$.			
Used in	<code>lex_alldifferent</code> , <code>sort_permutation</code> .			
See also	common keyword: <code>lex_greatereq</code> , <code>lex_lesseq</code> (<i>vector</i>). implied by: <code>disjoint</code> , <code>incomparable</code> , <code>lex_greater</code> , <code>lex_less</code> . negation: <code>lex_equal</code> . system of constraints: <code>lex_alldifferent</code> .			

Keywords

characteristic of a constraint: vector, disequality, automaton,
automaton without counters, reified automaton constraint.
constraint network structure: Berge-acyclic constraint network.
filtering: arc-consistency.

Arc input(s)	VECTOR1 VECTOR2
Arc generator	$\text{PRODUCT}(=) \mapsto \text{collection}(\text{vector1}, \text{vector2})$
Arc arity	2
Arc constraint(s)	$\text{vector1.var} \neq \text{vector2.var}$
Graph property(ies)	$\text{NARC} \geq 1$

Graph model Parts (A) and (B) of Figure 5.501 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NARC** graph property, the unique arc of the final graph is stressed in bold. It corresponds to a component where the two vectors differ.

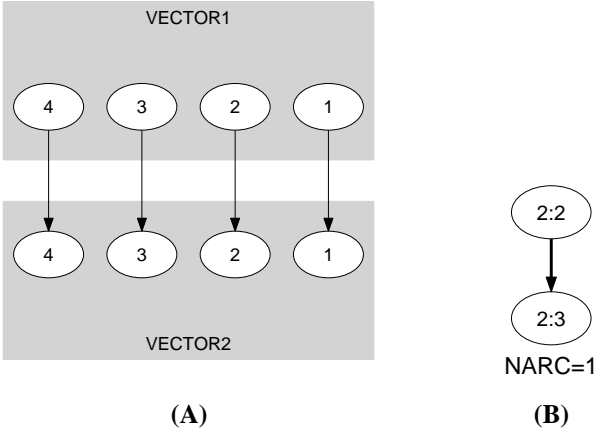


Figure 5.501: Initial and final graph of the `lex_different` constraint

Automaton

Figure 5.502 depicts the automaton associated with the `lex_different` constraint. Let VAR1_i and VAR2_i respectively be the `var` attributes of the i^{th} items of the `VECTOR1` and the `VECTOR2` collections. To each pair $(\text{VAR1}_i, \text{VAR2}_i)$ corresponds a 0-1 signature variable S_i as well as the following signature constraint: $\text{VAR1}_i = \text{VAR2}_i \Leftrightarrow S_i$.

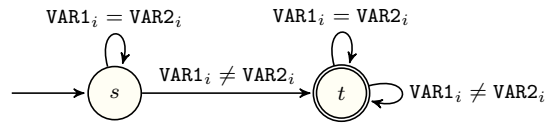


Figure 5.502: Automaton of the `lex_different` constraint

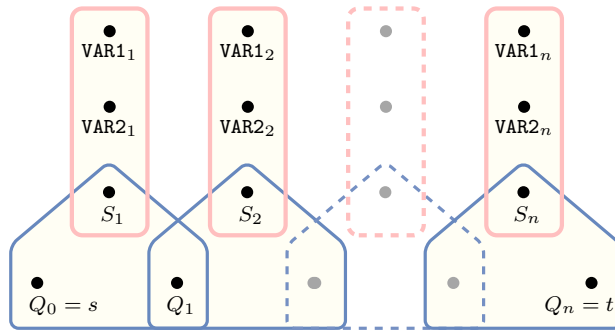


Figure 5.503: Hypergraph of the reformulation corresponding to the automaton of the `lex_different` constraint