5.195 int_value_precede

DESCRIPTION LINKS AUTOMATON

Origin [258]

Constraint int_value_precede(S, T, VARIABLES)

Synonyms precede, precedence, value_precede.

Arguments

S	:	int
T	:	int
VARIABLES	:	collection(var−dvar)

Restrictions

$\texttt{S} \neq \texttt{T}$
required(VARIABLES, var)

Purpose If value T occurs in the collection of variables VARIABLES then its first occurrence should be preceded by an occurrence of value S.

Example $(0, 1, \langle 4, 0, 6, 1, 0 \rangle)$

The int_value_precede constraint holds since the first occurrence of value 0 precedes the first occurrence of value 1.

Typical

$\texttt{S} < \texttt{T}$
$|\texttt{VARIABLES}| > 1$
atleast(1, VARIABLES, S)
atleast(1, VARIABLES, T)

Symmetries

- An occurrence of a value of VARIABLES.var that is different from S and T can be replaced by any other value that is also different from S and T.
- All occurrences of values S and T can be swapped in S, T and VARIABLES.var.

Arg. properties

- Suffix-contractible wrt. VARIABLES.
- Aggregate: S(id), T(id), VARIABLES(union).

Algorithm A filtering algorithm for maintaining value precedence is presented in [258]. Its complexity is linear to the number of variables of the collection VARIABLES.

Systems precede in **Gecode**, value_precede in **MiniZinc**.

See also **generalisation:** int_value_precede_chain(sequence *of* 2 values *replaced by* sequence *of at least* 2 values), set_value_precede(sequence *of* domain variables *replaced by* sequence *of* set variables).

Keywords

characteristic of a constraint: automaton, automaton without counters, reified automaton constraint.

constraint network structure: Berge-acyclic constraint network.

constraint type: order constraint.

filtering: arc-consistency.

symmetry: symmetry, indistinguishable values, value precedence.

Automaton

Figure 5.435 depicts the automaton associated with the int_value_precede constraint. Let $\texttt{VAR}_i$ be the i^{th} variable of the VARIABLES collection. To each triple $(\texttt{S}, \texttt{T}, \texttt{VAR}_i)$ corresponds a signature variable S_i as well as the following signature constraint: $(\texttt{VAR}_i = \texttt{S} \Leftrightarrow S_i = 1) \wedge (\texttt{VAR}_i = \texttt{T} \Leftrightarrow S_i = 2) \wedge (\texttt{VAR}_i \neq \texttt{S} \wedge \texttt{VAR}_i \neq \texttt{T} \Leftrightarrow S_i = 3)$.

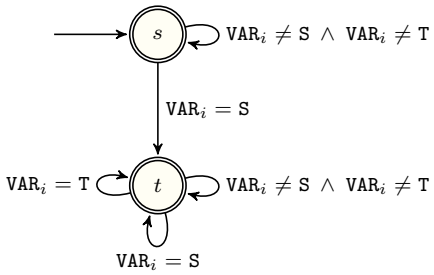

Figure 5.435: Automaton of the int_value_precede constraint (state s means that value S was not yet encountered, while state t means that value S was already encountered)

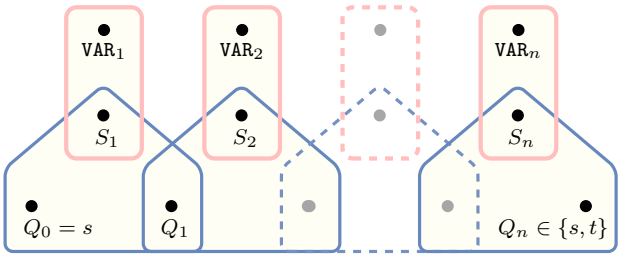

Figure 5.436: Hypergraph of the reformulation corresponding to the automaton of the int_value_precede constraint