

CONSTRUCTION OF A MINIMAL COVERING OF INCLUSION DEPENDENCES

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In paper automatic construction of an irredundant set of relationships on the scheme of a database which in the literature usually refer to as foreign keys [1] is considered.

The formal base for an relationships forming are inclusion dependences.

Definition 1. *Suppose that $R_i[A_1, \dots, A_m]$ and $R_j[B_1, \dots, B_p]$ – are relations of database (it is possible that they equals). $V \subseteq \{A_1, \dots, A_m\}$ and $W \subseteq \{B_1, \dots, B_p\}$, where $|V| = |W|$, and condition $\pi_V(R_i) \subseteq \pi_W(R_j)$ is held, then $R_i[V] \subseteq R_j[W]$ objectis called inclusion dependence.*

Where $|V|$ – cardinal number of V , $\pi_V(R_i)$ – projection of relation R_i on attributes V .

Let's turn to definition of relations between tables in databases, which are often used as reference integrity constraint.

Definition 2. *The relationship $L_1(i, j, X)$ is existed between relations R_i and R_j if the condition $PK(R_i) = PK(R_j)$ has been satisfied, and condition $\pi_X(R_j) \subseteq \pi_X(R_i)$ has been satisfied too for any of R_i u R_j where $X = R_i \cap R_j$, and $PK(R_i)$ – a primary key of ration R_i .*

Definition 3. *The relationship $L_M(i, j, X)$ is existed between tables R_i and R_j if the conditions $PK(R_i) \neq PK(R_j)$ and $PK(R_i) \subseteq R_j$ have been satisfied.*

Using properties of a minimal covering of functional dependences [2, 3], we shall receive following properties of inclusion dependences.

Theorem. *The relationship $L(i, j, X)$ is redundant, if following relationships are existed:*

$$L(i, m(1), X_0), L(m(1), m(2), X_1), \dots, L(m(p), j, X_p), \quad (1)$$

and $X \subseteq PK(i) \subseteq X_s \subseteq R_{m(s)}$, $s = 2, 3, \dots, p$.

The algorithm of formation of sequences (1) is a polynomial of the second order with respect to the total number of inclusion dependencies.

Algorithms of automatically generate of referential integrity constraints was implemented in accordance mathematical statements mentioned above and accordance to known mechanism of using relationshipson the databasescheme. The correctness and irredundant of theconstructionresults was proved. The software that implements the automatic construction of a complete irredundant set of relationshipson database scheme was developed.

REFERENCES

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