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Selection

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Synonyms

Selection (Relational Algebra)

Definition

Given a relation instance R over set of attributes U and a condition F, the selection $\sigma_F(R)$ returns a new relation over U consisting of the set of tuples of R which satisfy F. The condition F is an atom of the form $A = B$ or $A = c$, where A and B are attributes in U and c is a constant value.

The generalized selection allows more complex conditions: F can be an arbitrary Boolean combination of atoms of the form $A = B$ or $A \neq B$ or $A = c$ or $A \neq c$. Moreover, if a total order is defined on the domain of attributes, more general comparison atoms of the form $A\ \alpha\ B$ or $A\ \alpha\ c$ are allowed, where α ranges over $\{=, \neq, <, >, \leq, \geq\}$.

Key Points

The selection is one of the basic operators of the relational algebra. It operates by "selecting" rows of the input relation. A tuple t over U satisfies the condition $A = B$ if the values of attributes A and B in t are equal. Similarly t satisfies the condition $A = c$ if the value of attribute A in t is c. Satisfaction of generalized selection atoms is defined analogously.

As an example, consider a relation *Exams* over attributes (*course-number, student-number, grade*), containing tuples {(*EH*1, 1001, *A*), (*EH*1, 1002, *A*), (*GH*5, 1001, *C*)}. Then $\sigma_{grade=A \wedge course-number = EH1}(Exams)$ is a relation over attributes (*course-number, student-number, grade*) with tuples {(*EH*1, 1001, *A*), (*EH*1, 1002, *A*)}.

In the case that a relation schema is only specified by a relation name and arity, the result of the selection is a new relation having the same arity as the input one, containing the tuples which satisfy the selection condition. In this case the selection atoms are expressions of the form $j = k$ or $j = c$ (or $j\ \alpha\ k$ and $j\ \alpha\ c$ in the generalized selection). Here j and k are positive integers bounded by the arity of the input relation, identifying its j-th and k-th attributes, respectively.

Cross-References

- Relation
- Relational Algebra

L. Liu, M.T. Özsu (eds.), *Encyclopedia of Database Systems*,
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