INCLUSION AND EQUIVALENCE IBETWEEN RELATIONAL DATABASE SCHEMATA

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Summary

The Intentions of this paper are

- Conceptual relations among the relational database schemas were investigated on existing contributions proposed by various people.
- The different types of conceptual inclusion and equivalence between schemas were defined in terms of Query Language Q and Integrity constraints IC.
- He showed that the given concepts are adequate to formalize the comparisons and relationships involved in database schema transformation.

It is Important in database design because several transformations of database schema will be involved and for each transformation a particular relationship must hold between the original and transformed schema. So, we need relations that compare the ability of database schema to represent information and to answer queries.

The Main Ideas proposed in the paper are

- The various conceptual relations among relational database schemata are proposed and they are studied for general class of schemata.
- The existing conceptual relationships proposed by following people.
    - E.F. Codd- Only integration constraint allowed is Functional dependency. Neither Insertion-Deletion equivalent nor Query equivalent.
    - Bernstein & Goodman- Proposed 3 conceptual relations between Mono relational schema and decomposed schema and showed which of these relations hold between un-normalized and normalized schemata.
    - Sagiv & Ulman- Based on equivalence of the sets of fixed points of the projection and join mapping associated with database schemas.

    - Fagin & Sciore- Stressed the importance of horizontal decomposition and composition obtained by use of restrictions and union which are used in schemas involving hidden functional dependencies.
    - Kandzia & Klein- A general approach in which all restrictions were removed.

- He gave basic definitions of
    - Database Schema
    - Tuple of Relations
    - Instance of a Relation
    - Instance of Schema
- Two schemas S,S` are equivalent if for each instance i of S an instance i` of S` exists from which we can extract the same information and vice versa.
- He gave 2 definitions for Inclusion based on instance of decomposed schema and equivalence.
    - Weakly Included- contains at least the same information
    - Included- contains exactly the same information
- He showed examples of pairs of schemata with the corresponding conceptual relation and showed that given concepts are adequate to describe the following situations.
    - Views- For each instance of view there is an instance of global schema that provides at least the same info.
    - Lossless decomposition- For each instance of the un-decomposed schema there exists an instance of the decomposed schema which contains exactly the same info.
    - Dependency Preserving Decomposition- When the decomposition preserves the dependencies, the decomposition schema is included in the undecomposed one.
    - Independent decomposition- The decomposition is both lossless and dependency preserving.
    - Horizontal Decompositon- In distributed databases, the set of local schema should reflect exactly the same info as in global schema.
    - Hidden functional dependencies and Multiple decomposition- Sometimes, The hidden functional dependencies in undecomposed schema forces an horizontal decomposition followed by a vertical decomposition.

The final results are

- Comparing database schemata with respect to their ability to represent info and answer queries.
- The definitions defined in the paper can handle many different practical situations.
- The necessary conditions for conceptual relations among schemata obtained by both horizontal and vertical transformations.

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CS540- Database Management Systems