



IMPLEMENTING KEYS

During the [database development process](#), as we move from the logical data model to its implementation as a physical database, we need to understand how to enforce the requirements of [Codd's Relational Data Model](#) in the databases supported by the Database Management Systems (DBMS).

In the transition from the logical data model to an implemented database,

- the uniqueness of the data tuples in a relation (Codd) is implemented as primary keys of the records in the database tables.
- the relationships between the relations are implemented as foreign keys included in the records of the database tables.

PRIMARY KEYS

Primary keys are the DBMS implementation of the RDM requirement that the records in the table are a set, i.e., there are no records that contain duplicate data in the table. The primary key may be a single column, multiple columns or an attributive table.

SURROGATE KEYS

When the primary key is multiple columns or an attributive table, a single column surrogate key generated by the DBMS may be used to enhance database performance. But when a surrogate key is used to identify records in the table, the data in the records may be duplicated.

ALTERNATE KEYS

To avoid duplicate data in the table, alternate keys are defined on the table to ensure that the set requirement is met by the data in the table

For example, there may be multiple customer id numbers for a customer with the name Rainer Schoenrank when we know that name is unique in North America. But this table state may be necessary for customers named John Turner since that name is not unique.

FOREIGN KEYS

Foreign keys are not specified as part of the logical data model but are a requirement of the DBMS. Foreign keys are the DBMS implementation of the relationships between tables.

INDEXES

Indexes are used to enhance database performance when accessing data in the DBMS. As sound database design, there should be indexes on any column(s) used to find a record, such as

- primary key
- partial primary key for multiple column keys
- alternate key
- foreign key. Actually, sound practice indicates there should be indexes on the columns at both ends of a relationship.

REFERENCES:

Codd, Edgar, "A relational model for large shared databanks", Communications of the ACM, Vol. 13, No. 6, Jun 1970