Relational Database Model

Relational Model

- One single data modeling "tool": relation, or a 2D table;
- A relational database is a collection of relations;
- High degree of data independence
- Association between information elements (constraints)

More Formally

Relation: a two-dimensional table of columns and rows.

Attribute, Field: name of a *column* in the relation.

- take values from predefined *domains*

Record, tuple: a single row in the relation: a collection of *attribute values.*

Schema: the name of a *relation* plus the set of *attributes* of the relation (and their domains).

- E.g. Book(ISBN string, Title string, Author string, year integer).

Relation instance: a set of *tuples* for a given *relation.*

- changes with time (as stuff gets added, deleted, modified)
- schema usually does not change (althought it might in some cases)

Cardinality: number of tuples in a relation

Degree: number of attributes in a relation

Constraints

Superkey a collection of attributes in a relation that *uniquely identifies each tuple in it.*

Candidate key a *superkey* that has no *superkey subsets*

Primary key one *candidate key* per relation, designated to be the main way of maintaining tuple uniqueness.

Key constraint : each relation must have a primary key.

Foreign key a *primary key* of one relation, included in the attributes of another relation (usually for the purpose of linking two components of the database together).

Referential integrity constraint each collection of values of a *foreign key* in a relation must appear as a *primary key* in the referenced relation.

Null value : a "no value" value for a relational attribute. Lack of value, or value not yet available.

not null constraint : a statement that a specific attribute is not allowed to have null values. (e.g., primary key attributes).