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 (although 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).