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).