

## 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).