Database Design

The relational model

- We have been utilizing the relational model this semester. This model is based on the idea of ***relations***
- **REVIEW**
- A table is:
  - Database structure that holds data
  - Contains data about a specific ***entity*** type
  - A two-dimensional grid characterized by rows and columns
  - Holds a data item (***value***) at each row-column intersection
  - Has *at least* one column and zero or more rows (no rows = empty table)
  - Has a unique name within a database
- An ***entity type*** is a class of real world objects – a patient, movie, invoice… etc.

The relational model

- A column :
  - Represents a specific ***attribute*** (property) of the table's *entity type*
  - Each column has a ***domain*** (defined using data types) that restricts the set of values allowed in that column
  - Entries in columns are single-valued
  - Order (left to right) is unimportant
  - Each column has a name that identifies it uniquely within a table

A row:

- Each row describes a fact about an *entity*
- Each row contains a value or null
- Order (top to bottom) is unimportant
- No two rows in a table can be identical
- Each row in a table is uniquely identified by its primary key

Relationships

- A relationship is an association between common columns in two tables
- The foundation of a relational database
- Established how tables are related (linked) to each other
- ***Cardinality*** indicates the number of instances (none, one, or many) of an entity in relation to another entity.
- This can be expressed as:
  - One-to-one
  - One-to-many
  - Many-to-many

One-to-one

- In a one-to-one relationship, each row in table A can have **AT MOST ONE** matching row in the table B – and each row in table B can have **AT MOST ONE** matching row in table A

A primary key of one table is also the foreign key referencing the primary key of another table

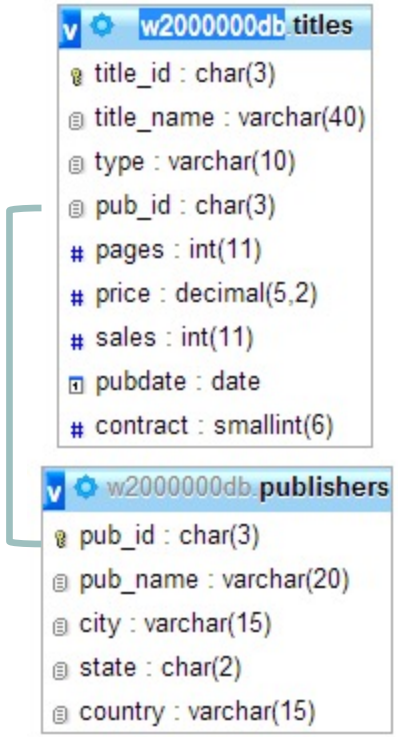
The relationship between the royalties table and the titles table is a one to one relationship.

One-to-many

- In a one-to-many relationship, each row in Table A can have many (zero or more matching rows in table B, but each row in table B has only one matching row in table A.

*A primary key of one table appears as a foreign key **in the many** table*

The relationship between the titles table and the publishers table is a one to many relationship.



Many-to-many

- In a many-to-many relations, each row in table A can have many (zero or more) matching rows in table B, and each row in table B can have many (zero or more) matching rows in table A.

A many to many relationship is established only by creating a third (junction) table that house the primary keys from both tables