Basics of Relational Database Modeling

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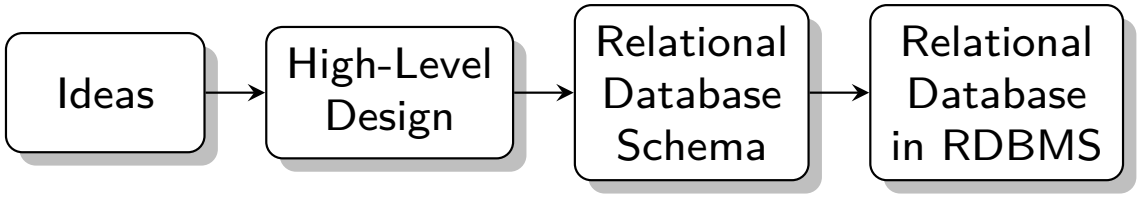
Outline

Overview


Ideas
High-Level Design
Relational Database Schema
Relational Database in RDBMS

Outline

Relation in Relation Model

Relation models are based on *relations* where a relation is a 2-dimensional table.

Name	Start Year	Major	E-Mail
John Doe	2021	Computer Science	johndoe@johndoe.info
Jane Doe	2020	Information Systems	janedoe@johndoe.info

- The columns of a relation are named by *attributes*.
- The rows of a relation, other than the header row containing the attribute names, are called *tuples*.
- A relation is a set of tuples, *not* a list of tuples.
- Moreover, we can reorder the attributes of the relation as we choose, without changing the relation.

Schema

A relation is defined by its schema consisting of

- the name of the relation, and
- the set of attributes

Example.

`Student(name, startyear, major, email)`

Domains

- Each component of each tuple be *atomic*, i.e., each must be of some elementary type. The elementary type of an attribute is called the *domain* of the attribute.

Example.

`Student(name:string, startyear:integer, major:string, email:string)`

Exercise. Are these two schemas the same relation?

```
Student(name:string, startyear:integer, major:string,
email:string)
```

```
Student(startyear:integer, name:string, major:string,
email:string)
```

Relational Instance

A set of tuples for a given relation an instance of that relation

Keys of Relations

- The relational model allows us to place many types of contraints on database schemas.
- The key constraints are fundamental

Example. `Student(startyear:integer, name:string, major:string, email:string)`

- Many real-world databases use artificial keys
  - is it safe to make any assumption about the values of attributes outside their control?
  - for efficiency consideration

Example. Employee ID, Student ID, Course ID ...

An Example of Relational Database Schema

```
Student(sid:string, name:string, startyear:integer)
Class(cid:string, title:string, section:string,
semester:string, year:integer, hours:integer)
Enrollment(sid, cid:string)
```

Outline

Assignment

Let's work on an exercise problem ...