

How do we **uniquely identify** entities?

How do we recognize things in the real world (people, objects, animals, twins...)? Because of a "fingerprint": a particular combination of attributes.

Is a particular set of columns enough to *discriminate all the real entities you will have to deal with?*

What is a Primary Key (PK)

Primary Key: A set of columns which discriminates all tuples.

Columns participating in the primary key are usually shown underlined.

Examples

- Classrooms(building, room_number, capacity)
- CarTypes(manufacturer, model, tank_size, num_doors)
- Movies(title, year, duration, genre)
- MovieStars(name, birthdate, gender)

Primary Key SQL

Mark the field you want to use as PK

```
CREATE TABLE users (  
  id SERIAL PRIMARY KEY,  
  first_name VARCHAR(50),  
  last_name VARCHAR(100),  
);
```

Identify the group of columns to be used as PK

```
CREATE TABLE emails (  
  username VARCHAR(255),  
  hostname VARCHAR(255),  
  PRIMARY KEY (username, hostname)  
);
```

Frequently, **auto-generated IDs** are used as Primary Keys.

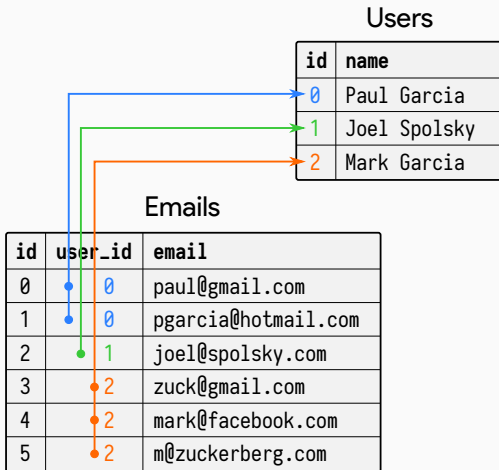
Sometimes called surrogate keys.

Advantages

- IDs never have to change. Changing primary keys is possible, but costly.
If email/username is the PK, changing it is usually not allowed
- It is easier for the Database to ensure uniqueness.
- The PK is more compact (even though it *adds* a column).
- More efficient when inserting into B-trees.
- Easier to reference from another table (as a *foreign key*).

Foreign Keys

A column in one table stores the ID (primary key) of another table.



Foreign Key SQL

```
CREATE TABLE users (  
  id SERIAL PRIMARY KEY,  
  name VARCHAR(255)  
);
```

```
CREATE TABLE emails (  
  id SERIAL PRIMARY KEY,  
  user_id INTEGER REFERENCES users(id),  
  email VARCHAR(255)  
);
```

The **PRIMARY KEY** constraint is equivalent to **UNIQUE, NOT NULL** (and adds an index to the PK).

FOREIGN KEY constraints:

- Do not allow insertion of entities not having "parents".
- Do not allow removal of parents with "child" entities.

The ON DELETE policy can configure that.