Data Management Systems
PostgreSQL

Matteo Devigili

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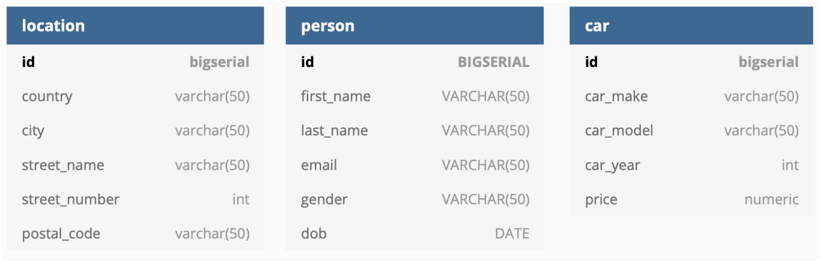
SET UP

What we have



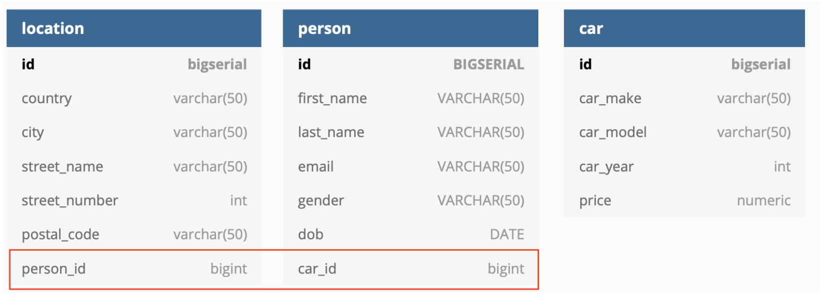
location	
id	**bigserial**
country	varchar(50)
city	varchar(50)
street_name	varchar(50)
street_number	int
postal_code	varchar(50)

person	
id	**BIGSERIAL**
first_name	VARCHAR(50)
last_name	VARCHAR(50)
email	VARCHAR(50)
gender	VARCHAR(50)
dob	DATE

car	
id	**bigserial**
car_make	varchar(50)
car_model	varchar(50)
car_year	int
price	numeric

SET UP

What we need



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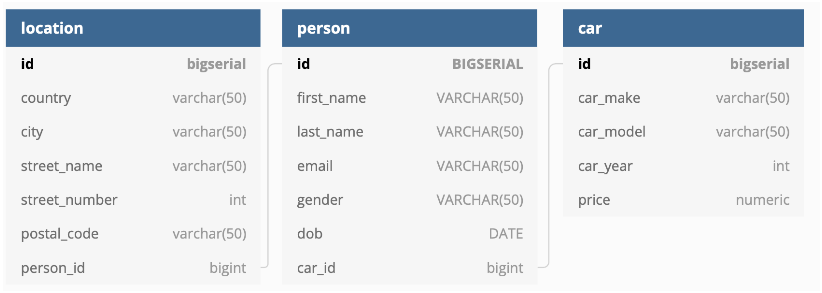
car	
id	**bigserial**
car_make	varchar(50)
car_model	varchar(50)
car_year	int
price	numeric

SET UP

Relations



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dob	DATE
car_id	bigint

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id	**bigserial**
car_make	varchar(50)
car_model	varchar(50)
car_year	int
price	numeric

FOREIGN KEY

- *FOREIGN KEY*: specifies that the values in a column (or a group of columns) must match the values appearing in some row of another table

Postgre - Constraints

FOREIGN KEY

many-to-many example

```
CREATE TABLE courses (
        SMM_Code text PRIMARY KEY
        Lecturer text
        Term text);

CREATE TABLE student (
        Student_id int PRIMARY KEY
        firs_name text
        last_name text);
```

```
CREATE TABLE grades (
        SMM_Code text REFERENCES courses,
        Student_id text REFERENCES student,
        Grade varchar(1),
        PRIMARY KEY (SMM_Code, Student_id )
        );
```

FOREIGN KEY

many-to-many example

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CREATE TABLE courses (
        SMM_Code text PRIMARY KEY
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CREATE TABLE student (
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CREATE TABLE grades (
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        Student_id text REFERENCES student,
        Grade varchar(1),
        PRIMARY KEY (SMM_Code, Student_id )
        );
```

SQL

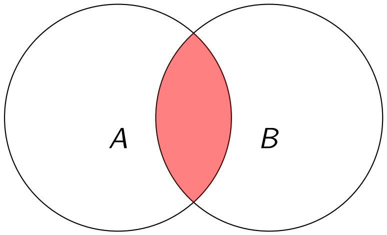
Recap of commands

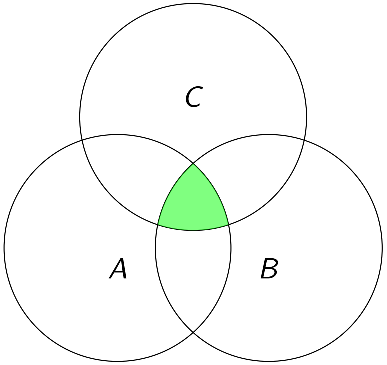
- *ALTER TABLE*: to change the definition of an existing table
- *DELETE FROM WHERE*: to delete rows that satisfy a condition from a table
- *UPDATE SET WHERE*: to change the values of the specified columns in all rows that satisfy a condition

PostgreSQL

INNER JOIN

Venn diagram





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INNER JOIN

A

a
b
c
d

B

c
d
e
f

$$\longrightarrow$$

c
d

INNER JOIN

Joining tables on column id of table **A**, and column A_id of table **B**:

A

id	year
1	2008
2	2010
3	2012

B

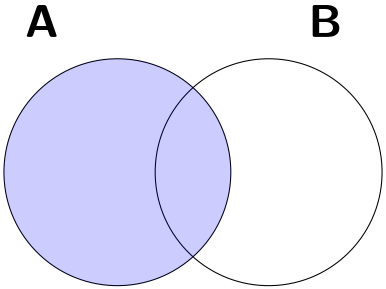
A_id	city
1	Beijing
3	London
5	Rio de Janeiro

C

id	year	A_id	city
1	2008	1	Beijing
3	2012	3	London

LEFT OUTER JOIN

Venn diagram



LEFT OUTER JOIN

LEFT (OUTER) JOIN on column id of table **A**, and column A_id of table **B**:

A

id	year
1	2008
2	2010
3	2012

B

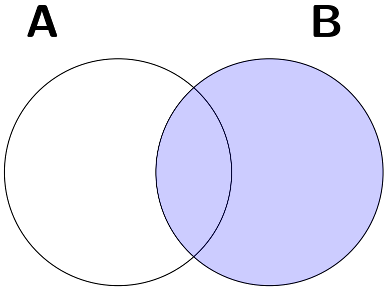
A_id	city
1	Beijing
3	London
5	Rio de Janeiro

C

id	year	A_id	city
1	2008	1	Beijing
2	2010		
3	2012	3	London

RIGHT OUTER JOIN

Venn diagram



RIGHT OUTER JOIN

RIGHT (OUTER) JOIN on column id of table **A**, and column A_id of table **B**:

A

id	year
1	2008
2	2010
3	2012

B

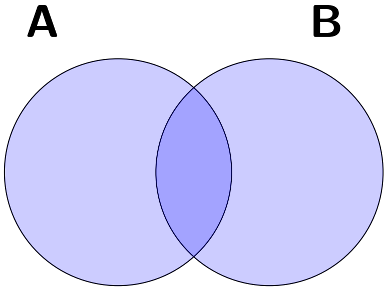
A_id	city
1	Beijing
3	London
5	Rio de Janeiro

C

id	year	A_id	city
1	2008	1	Beijing
3	2012	3	London
		5	Rio de Janeiro

FULL OUTER JOIN

Venn diagram



FULL OUTER JOIN

FULL (OUTER)JOIN on column id of table **A**, and column A_id of table **B**:

A

id	year
1	2008
2	2010
3	2012

B

A_id	city
1	Beijing
3	London
5	Rio de Janeiro

C

id	year	A_id	city
1	2008	1	Beijing
2	2010		
3	2012	3	London
		5	Rio de Janeiro

CROSS JOIN

A

1
2

B

a
b

$\longrightarrow$

1	a
1	b
2	a
2	b

SQL - Joins
Recap

- *(INNER) JOIN . . . ON*: For each row R1 of A, the joined table has a row for each row in B that satisfies the join condition with R1.
- *LEFT (OUTER) JOIN . . . ON*: First, an inner join is performed. Then, for each row in A that does not satisfy the join condition with any row in B, a joined row is added with null values in columns of B. Thus, the joined table always has at least one row for each row in A.
- *RIGHT (OUTER) JOIN . . . ON*: First, an inner join is performed. Then, for each row in B that does not satisfy the join condition with any row in A, a joined row is added with null values in columns of A. This is the converse of a left join: the result table will always have a row for each row in B.

PostgreSQL - Joined Tables

SQL - Joins

Recap

- *FULL (OUTER) JOIN . . . ON*: First, an inner join is performed. Then, for each row in A that does not satisfy the join condition with any row in B, a joined row is added with null values in columns of B. Also, for each row of B that does not satisfy the join condition with any row in A, a joined row with null values in the columns of A is added.
- *CROSS JOIN*: For every possible combination of rows from A and B (i.e., a Cartesian product), the joined table will contain a row consisting of all columns in A followed by all columns in B.

PostgreSQL - Joined Tables

References

- Obe, Regina O., and Leo S. Hsu. PostgreSQL: Up and Running: a Practical Guide to the Advanced Open Source Database. "O'Reilly Media, Inc.", 2017.
- PostgreSQL 12.2 Documentation `https://www.postgresql.org/docs/12/index.html`
- SQL tutorial `https://www.sqltutorial.org`