Welcome!

FUNCTIONS FOR MANIPULATING DATA IN POSTGRESQL

SQL

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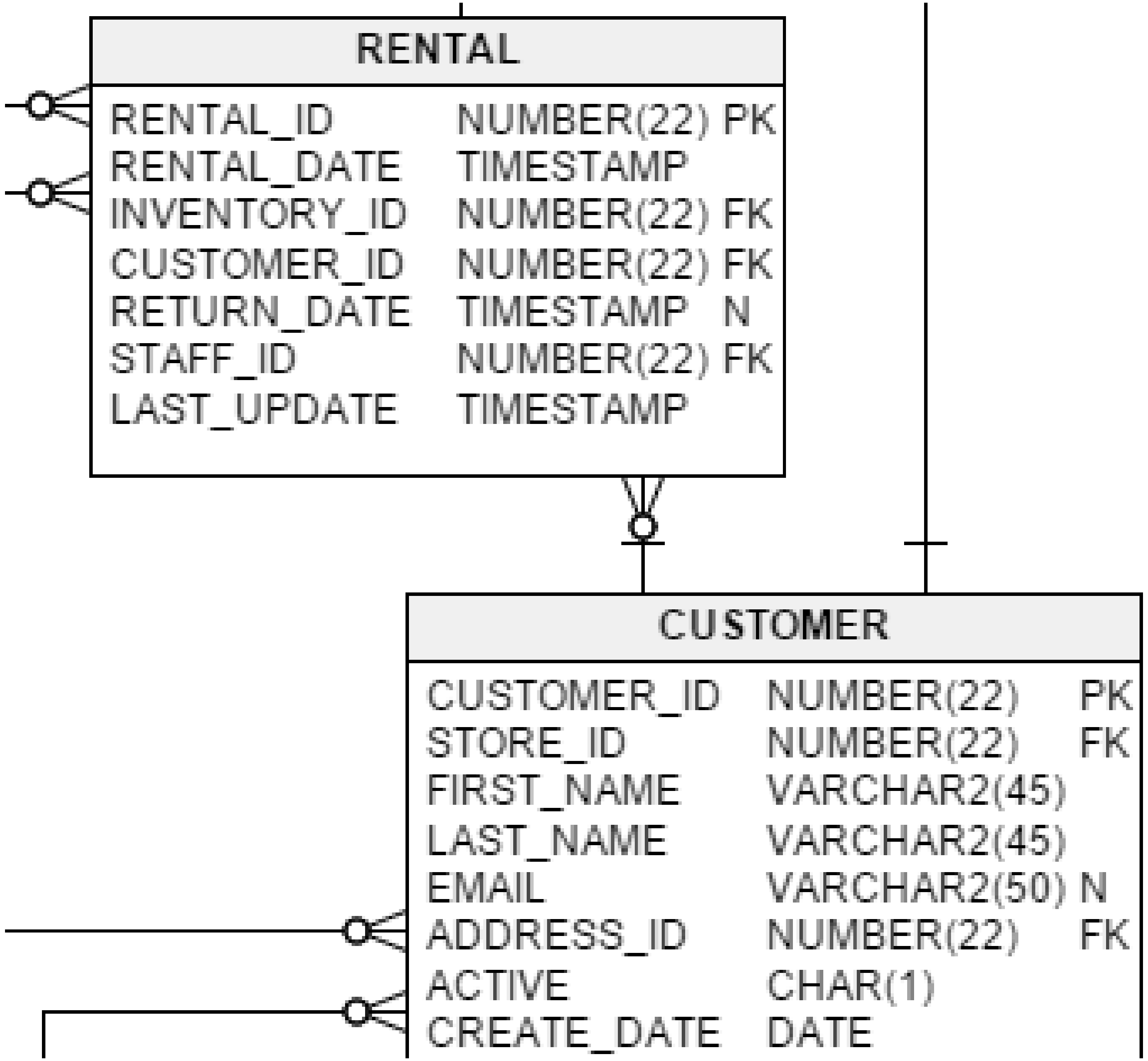
The Sakila Database



RENTAL		
RENTAL_ID	NUMBER(22)	PK
RENTAL_DATE	TIMESTAMP	
INVENTORY_ID	NUMBER(22)	FK
CUSTOMER_ID	NUMBER(22)	FK
RETURN_DATE	TIMESTAMP	N
STAFF_ID	NUMBER(22)	FK
LAST_UPDATE	TIMESTAMP	

CUSTOMER		
CUSTOMER_ID	NUMBER(22)	PK
STORE_ID	NUMBER(22)	FK
FIRST_NAME	VARCHAR2(45)	
LAST_NAME	VARCHAR2(45)	
EMAIL	VARCHAR2(50)	N
ADDRESS_ID	NUMBER(22)	FK
ACTIVE	CHAR(1)	
CREATE_DATE	DATE	

- Highly normalized
- Representative data types
- Custom functions

Topics

- Common data types in PostgreSQL
- Date and time functions and operators
- Parsing and manipulating text
- Full-text search and PostgreSQL Extensions

Common data types

- Text data types
  - `CHAR` , `VARCHAR` and `TEXT`
- Numeric data types
  - `INT` and `DECIMAL`
- Date / time data types
  - `DATE` , `TIME` , `TIMESTAMP` , `INTERVAL`
- Arrays

Text data types

```
SELECT title
FROM film
LIMIT 5
```

```
+-------------------+
| title             |
|-------------------|
| ACADEMY DINOSAUR  |
| ACE GOLDFINGER    |
| ADAPTATION HOLES  |
| AFFAIR PREJUDICE  |
| AFRICAN EGG       |
+-------------------+
```

```
SELECT description
FROM film
LIMIT 2
```

```
+-----------------------------------------+
| description                             |
|-----------------------------------------|
| A Epic Drama of a Feminist And a Mad    |
|  Scientist who must Battle a Teacher in |
|  The Canadian Rockies.                  |
| A Astounding Epistle of a Database      |
|  Administrator And a Explorer who       |
|  must Find a Car in Ancient China       |
+-----------------------------------------+
```

Numeric data types

```
SELECT
    payment_id
FROM payment
LIMIT 5
```

```
SELECT
    amount
FROM payment
LIMIT 5
```

```
+-------------+
| payment_id  |
|-------------|
| 1           |
| 2           |
| 3           |
| 4           |
| 5           |
+-------------+
```

```
+--------+
| amount |
|--------|
| 2.99   |
| 0.99   |
| 5.99   |
| 0.99   |
| 9.99   |
+--------+
```

Determining data types from existing tables

```
SELECT
    title,
    description,
    special_features
FROM FILM
LIMIT 5
```

```
+---------------+------------------+------------------------------+
| title         |  description     | special_features             |
|---------------|------------------|------------------------------|
| ACADEMY D...  | A Epic...        | {Deleted Scenes,Behi...}     |
| ACE GOLD...   | A Astound..      | {Trailers,Deleted Scenes}    |
| AFFAIR PR...  | A Fanciful,..    | {Commentaries,Behind the...} |
+---------------+------------------+------------------------------+
```

Determining data types from existing tables

```sql
SELECT
    column_name,
    data_type
FROM INFORMATION_SCHEMA.COLUMNS
WHERE column_name in ('title','description','special_features')
  AND table_name ='film';
```

```
+------------------+-------------------+
| column_name      | data_type         |
|------------------|-------------------|
| title            | character varying |
| description      | text              |
| special_features | ARRAY             |
+------------------+-------------------+
```

Let's practice!

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Date and time data types

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TIMESTAMP data types

- ISO 8601 format: yyyy-mm-dd

```
+--------------------------------+
| timestamp                      |
|--------------------------------|
| 2019-03-26 01:05:17.93027+00 |
+--------------------------------+
```

```sql
SELECT payment_date
FROM payment;
```

```
+---------------------+
| payment_date        |
|---------------------|
| 2005-05-25 11:30:37 |
+---------------------+
```

DATE and TIME data types

```
+------------+-------------------+
| date       | time              |
|------------|-------------------|
| 2005-05-28 | 01:05:17.93027+00 |
+------------+-------------------+
```

```
SELECT create_date
FROM customer
```

```
+-------------+
| create_date |
|-------------|
| 2006-02-14  |
+-------------+
```

INTERVAL data types

```
+-----------+
| interval  |
|-----------|
| 4 days    |
+-----------+
```

```sql
SELECT rental_date + INTERVAL '3 days' as expected_return
FROM rental;
```

```
+---------------------+
| expected_return     |
|---------------------|
| 2005-05-27 22:53:30 |
+---------------------+
```

Looking at date and time types

```sql
SELECT
    column_name,
    data_type
FROM INFORMATION_SCHEMA.COLUMNS
WHERE column_name in ('rental_date')
  AND table_name ='rental';
```

```
+-------------+-----------------------------+
| column_name | data_type                   |
|-------------|-----------------------------|
| rental_date | timestamp without time zone |
+-------------+-----------------------------+
```

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Working with ARRAYs

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Before we get started

CREATE TABLE example

```
CREATE TABLE my_first_table (
    first_column text,
    second_column integer
);
```

INSERT example

```
INSERT INTO my_first_table
    (first_column, second_column) VALUES ('text value', 12);
```

ARRAY a special type

Let's create a simple table with two array columns.

```
CREATE TABLE grades (
    student_id int,
    email text[][],
    test_scores int[]
);
```

INSERT statements with ARRAYS

Example INSERT statement:

```
INSERT INTO grades
    VALUES (1,
    '{{"work","work1@datacamp.com"},{"other","other1@datacamp.com"}}',
    '{92,85,96,88}' );
```

Accessing ARRAYs

```sql
SELECT
   email[1][1] AS type,
   email[1][2] AS address,
   test_scores[1],
FROM grades;
```

```
+--------+--------------------+-------------+
| type   |  address           | test_scores |
|--------|--------------------|-------------|
| work   | work1@datacamp.com | 92          |
| work   | work2@datacamp.com | 76          |
+--------+--------------------+-------------+
```

Note that PostgreSQL array indexes start with one and not zero.

Searching ARRAYs

```
SELECT
   email[1][1] as type,
   email[1][2] as address,
   test_scores[1]
FROM grades
WHERE email[1][1] = 'work';
```

```
+--------+--------------------+-------------+
| type   |  address           | test_scores |
|--------|--------------------|-------------|
| work   | work1@datacamp.com | 92          |
| work   | work2@datacamp.com | 76          |
+--------+--------------------+-------------+
```

ARRAY functions and operators

```
SELECT
   email[2][1] as type,
   email[2][2] as address,
   test_scores[1]
FROM grades
WHERE 'other' = ANY (email);
```

```
+---------+---------------------+-------------+
| type    |  address            | test_scores |
|---------|-----------------------------------|
| other   | other1@datacamp.com | 92          |
| null    | null                | 76          |
+---------+---------------------+-------------+
```

ARRAY functions and operators

```sql
SELECT
   email[2][1] as type,
   email[2][2] as address,
   test_scores[1]
FROM grades
WHERE email @> ARRAY['other'];
```

```
+---------+---------------------+-------------+
| type    |  address            | test_scores |
|---------|-----------------------------------|
| other   | other1@datacamp.com | 92          |
| null    | null                | 76          |
+---------+---------------------+-------------+
```

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