BAZY DANYCH

SWIAT RELACYJNY

Encje

Atrybuty encji

Związki encji
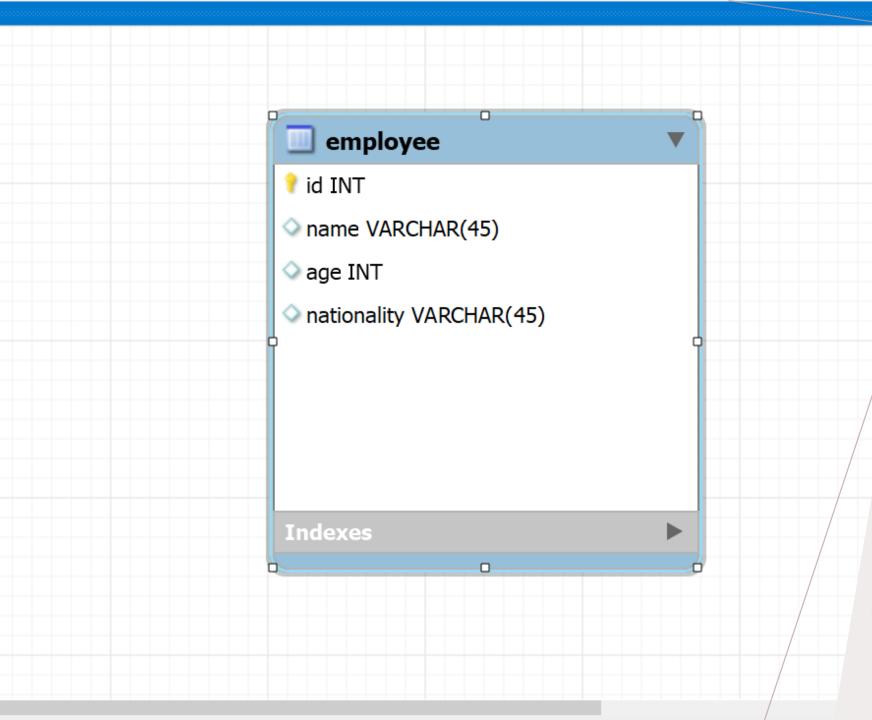
SQL

Structured **Q**uery **L**anguage (Strukturalny Język Zapytań)

Język programowania zaprojektowany do zarządzania danymi przechowywanymi w **relacyjnej** bazie danych. Podstawowym elementem składniowym języka są proste, **deklaratywne** instrukcje.

RELACYJNE
BAZY DANYCH

RELACYJNE BAZY DANYCH

TERMINOLOGIA

Kwerenda, zapytanie (query), instrukcja (statement, instruction), komenda (command) - najmniejsza, samodzielna część skryptu SQL, która może być poprawnie wykonana na bazie. Składa się z klauzul.

Klauzula (clause)

Tabela (table), relacja (relation) – kolekcja danych zorganizowana w wiersze i kolumny

Kolumna (column), pole, atrybut (atribute), cecha

Wiersz (row), rekord (record), wpis (entry), encja (entity)

KONWENCJA JEZYKOWA

Znak końca instrukcji - ; (średnik)

Klauzule zapisujemy wielkimi literami.

RDBMS

Relational DataBase Management System
(System zarządzania relacyjną bazą danych)

DBMS

DataBase Management System

SQLITE

https://www.sqlite.org/index.html

SQLite

Small. Fast. Reliable.
Choose any three.

Home   About   Documentation   Download   License   Support   Purchase   Search

What Is SQLite?

SQLite is a C-language library that implements a small, fast, self-contained, high-reliability, full-featured, SQL database engine. SQLite is the most used database engine in the world. SQLite is built into all mobile phones and most computers and comes bundled inside countless other applications that people use every day. More Information...

The SQLite file format is stable, cross-platform, and backwards compatible and the developers pledge to keep it that way through the year 2050. SQLite database files are commonly used as containers to transfer rich content between systems [1] [2] [3] and as a long-term archival format for data [4]. There are over 1 trillion (1e12) SQLite databases in active use [5].

SQLite source code is in the public-domain and is free to everyone to use for any purpose.

Latest Release

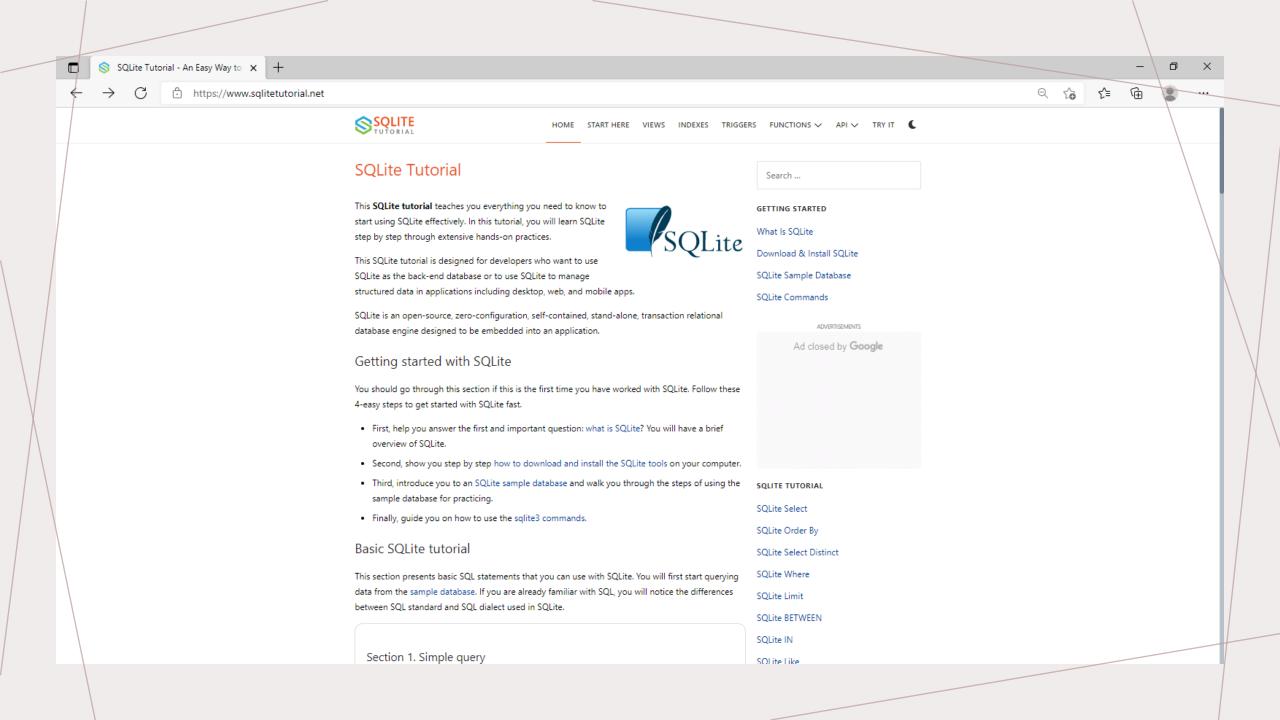Version 3.36.0 (2021-06-18). [Download] [Prior Releases]

Common Links

- Features
- When to use SQLite
- Getting Started
- Prior Releases
- SQL Syntax
  - Pragmas
  - SQL functions
  - Date & time functions
  - Aggregate functions
  - Window functions
  - Math functions
  - JSON functions
- C/C++ Interface Spec
  - Introduction
  - List of C-language APIs
- The TCL Interface Spec
- Quirks and Gotchas
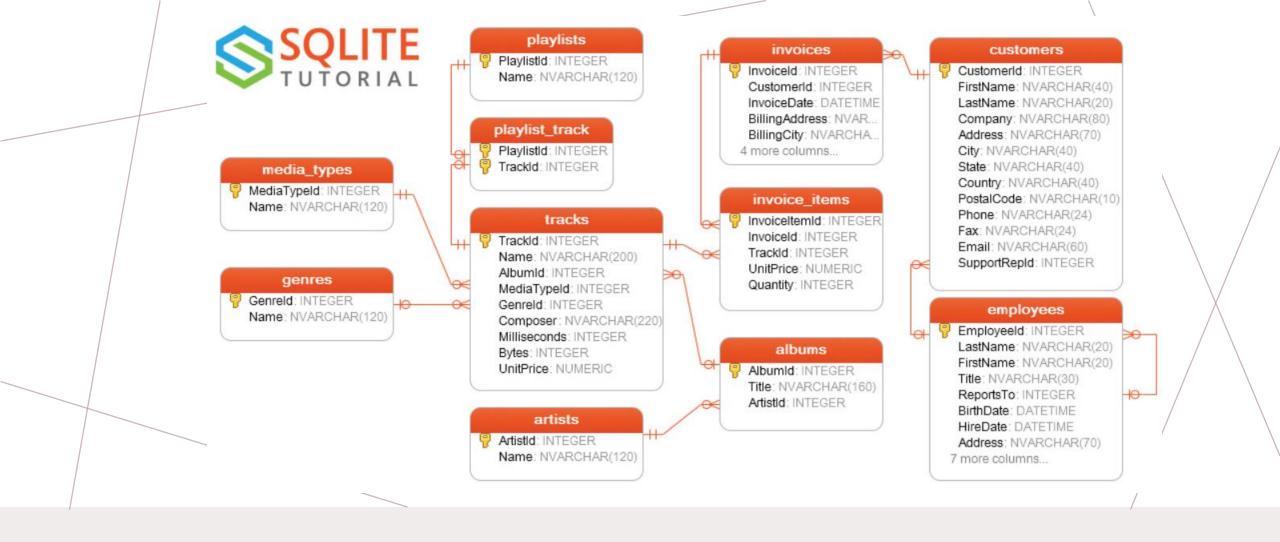- Frequently Asked Questions
- Commit History
- Bugs
- News

Ongoing development and support of SQLite is made possible in part by SQLite Consortium members, including:
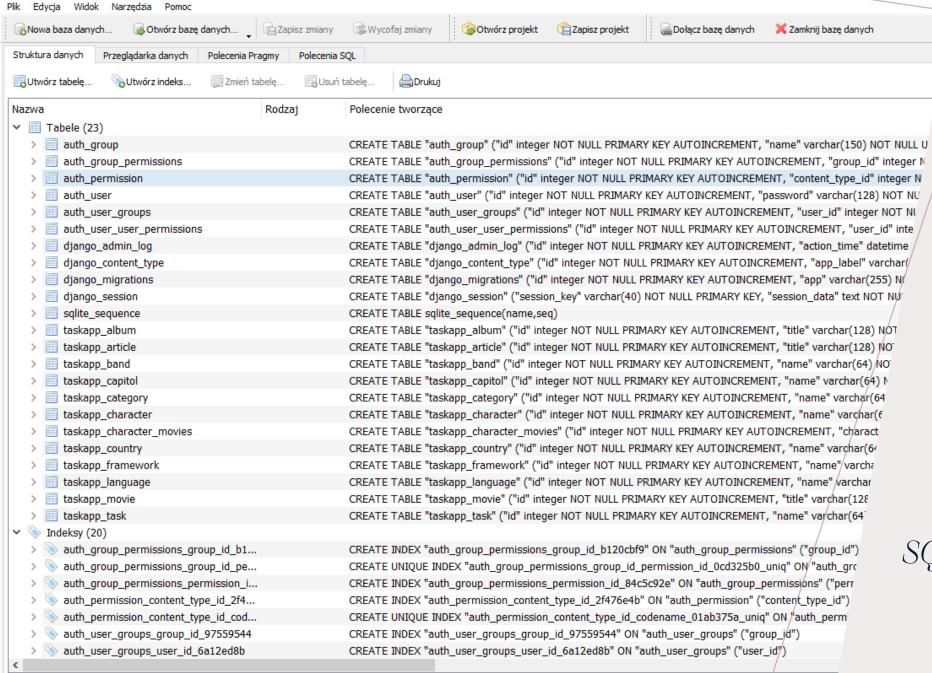
SQLite Tutorial

This **SQLite tutorial** teaches you everything you need to know to start using SQLite effectively. In this tutorial, you will learn SQLite step by step through extensive hands-on practices.

This SQLite tutorial is designed for developers who want to use SQLite as the back-end database or to use SQLite to manage structured data in applications including desktop, web, and mobile apps.

SQLite is an open-source, zero-configuration, self-contained, stand-alone, transaction relational database engine designed to be embedded into an application.

Getting started with SQLite

You should go through this section if this is the first time you have worked with SQLite. Follow these 4-easy steps to get started with SQLite fast.

- First, help you answer the first and important question: what is SQLite? You will have a brief overview of SQLite.

- Second, show you step by step how to download and install the SQLite tools on your computer.

- Third, introduce you to an SQLite sample database and walk you through the steps of using the sample database for practicing.

- Finally, guide you on how to use the sqlite3 commands.

Basic SQLite tutorial

This section presents basic SQL statements that you can use with SQLite. You will first start querying data from the sample database. If you are already familiar with SQL, you will notice the differences between SQL standard and SQL dialect used in SQLite.

Section 1. Simple query

CHINOOK

SQLITE GUI CLIENT –
DB BROWSER

```
C:\Windows\System32\cmd.exe - sqlite3.exe db.sqlite3

Microsoft Windows [Version 10.0.19044.1586]
(c) Microsoft Corporation. Wszelkie prawa zastrzeżone.

C:\Users\jerem\PycharmProjects\ZDPYTpol46_backend>sqlite3.exe db.sqlite3
SQLite version 3.38.2 2022-03-26 13:51:10
Enter ".help" for usage hints.
sqlite> select * from django_migrations;
1|contenttypes|0001_initial|2022-03-24 19:10:57.309449
2|auth|0001_initial|2022-03-24 19:10:57.370417
3|admin|0001_initial|2022-03-24 19:10:57.400400
4|admin|0002_logentry_remove_auto_add|2022-03-24 19:10:57.424383
5|admin|0003_logentry_add_action_flag_choices|2022-03-24 19:10:57.449367
6|contenttypes|0002_remove_content_type_name|2022-03-24 19:10:57.491344
7|auth|0002_alter_permission_name_max_length|2022-03-24 19:10:57.516330
8|auth|0003_alter_user_email_max_length|2022-03-24 19:10:57.534318
9|auth|0004_alter_user_username_opts|2022-03-24 19:10:57.553308
10|auth|0005_alter_user_last_login_null|2022-03-24 19:10:57.575310
11|auth|0006_require_contenttypes_0002|2022-03-24 19:10:57.585290
12|auth|0007_alter_validators_add_error_messages|2022-03-24 19:10:57.604284
13|auth|0008_alter_user_username_max_length|2022-03-24 19:10:57.625283
14|auth|0009_alter_user_last_name_max_length|2022-03-24 19:10:57.644256
15|auth|0010_alter_group_name_max_length|2022-03-24 19:10:57.667249
16|auth|0011_update_proxy_permissions|2022-03-24 19:10:57.682234
17|auth|0012_alter_user_first_name_max_length|2022-03-24 19:10:57.707235
18|sessions|0001_initial|2022-03-24 19:10:57.729217
19|taskapp|0001_initial|2022-03-24 19:38:00.782212
20|taskapp|0002_band|2022-03-24 19:38:00.791208
21|taskapp|0003_category|2022-03-24 19:46:17.921446
22|taskapp|0004_alter_category_description|2022-03-24 19:47:03.022597
23|taskapp|0005_article|2022-03-24 19:55:11.537016
24|taskapp|0006_album|2022-03-24 20:03:30.393453
25|taskapp|0007_capitol_language_movie_framework_country_character|2022-03-28 16:31:17.736793
26|taskapp|0008_album_band|2022-03-28 16:50:35.520866
27|taskapp|0009_alter_character_table|2022-03-28 17:08:13.934086
28|taskapp|0010_alter_character_table|2022-03-28 17:10:53.656707
sqlite>
```

SQLITE CLI CLIENT –
SQLITE3

MySQL

mysql.com

The world's most popular open source database

MySQL

MYSQL.COM   DOWNLOADS   DOCUMENTATION   DEVELOPER ZONE

Products   Cloud   Services   Partners   Customers   Why MySQL?   News & Events   How to Buy

Try MySQL HeatWave for Free
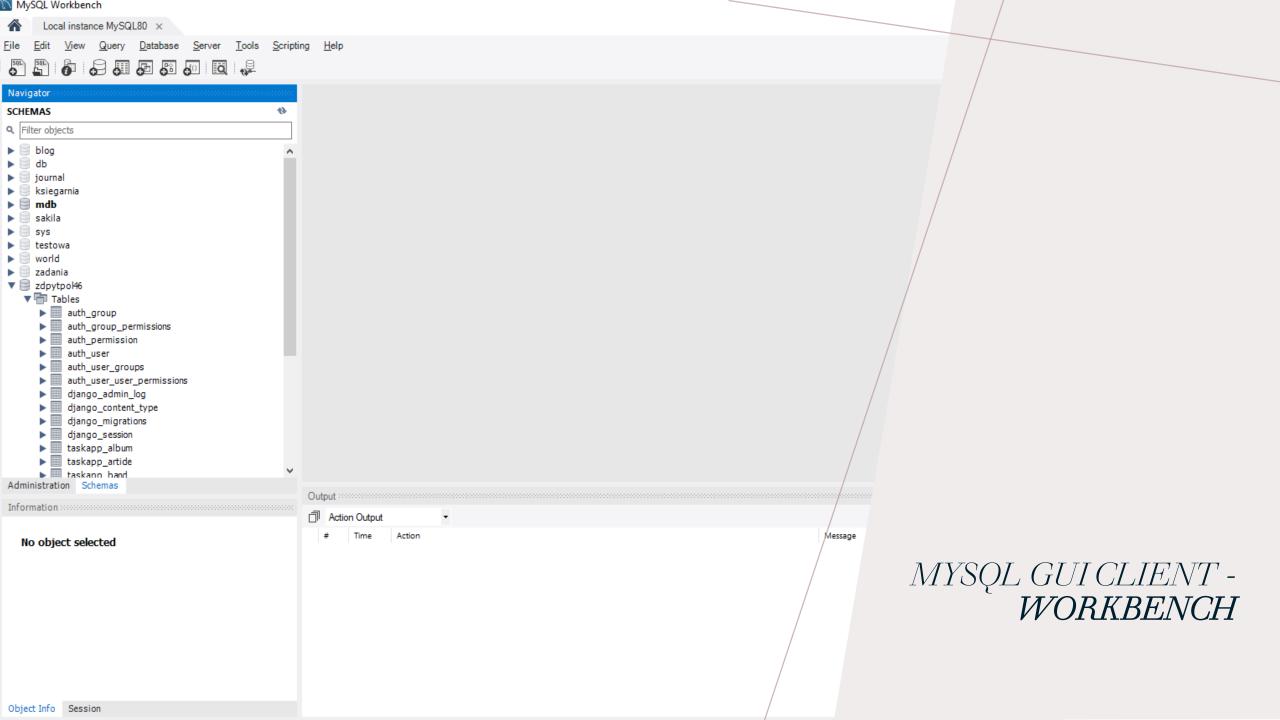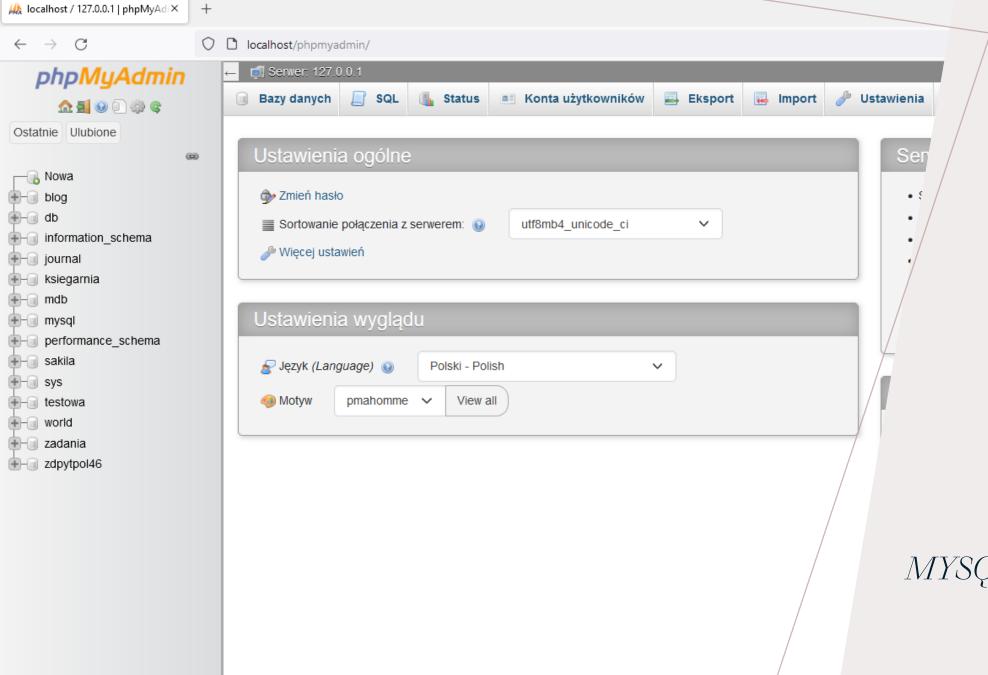
Get US$300 in credit for 30 days

TRY NOW

MySQL HeatWave

MySQL HeatWave is a fully managed service that enables customers to run OLTP and OLAP workloads directly from their MySQL Database. HeatWave, an integrated, high-performance query accelerator, boosts MySQL performance by 5400x.

Learn More »

MySQL Enterprise Edition

The most comprehensive set of advanced features, management tools and technical support to achieve the highest levels of MySQL scalability, security, reliability, and uptime.

Learn More »

MYSQL GUI CLIENT - WORKBENCH

*MYSQL GUI CLIENT –
PHPMYADMIN*

```
Microsoft Windows [Version 10.0.19044.1586]
(c) Microsoft Corporation. Wszelkie prawa zastrzeżone.

C:\Users\jerem>mysql -u root -p
Enter password: *************
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 20
Server version: 8.0.26 MySQL Community Server - GPL

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> select * from zdpytpol46.django_migrations;
+----+--------------+----------------------------------------------------------+----------------------------+
| id | app          | name                                                     | applied                    |
+----+--------------+----------------------------------------------------------+----------------------------+
|  1 | contenttypes | 0001_initial                                             | 2022-03-28 17:45:13.807284 |
|  2 | auth         | 0001_initial                                             | 2022-03-28 17:45:14.926662 |
|  3 | admin        | 0001_initial                                             | 2022-03-28 17:45:15.208500 |
|  4 | admin        | 0002_logentry_remove_auto_add                            | 2022-03-28 17:45:15.227488 |
|  5 | admin        | 0003_logentry_add_action_flag_choices                    | 2022-03-28 17:45:15.244480 |
|  6 | contenttypes | 0002_remove_content_type_name                            | 2022-03-28 17:45:15.560297 |
|  7 | auth         | 0002_alter_permission_name_max_length                    | 2022-03-28 17:45:15.674246 |
|  8 | auth         | 0003_alter_user_email_max_length                         | 2022-03-28 17:45:15.710210 |
|  9 | auth         | 0004_alter_user_username_opts                            | 2022-03-28 17:45:15.726201 |
| 10 | auth         | 0005_alter_user_last_login_null                          | 2022-03-28 17:45:15.839137 |
| 11 | auth         | 0006_require_contenttypes_0002                           | 2022-03-28 17:45:15.844132 |
| 12 | auth         | 0007_alter_validators_add_error_messages                 | 2022-03-28 17:45:15.858125 |
| 13 | auth         | 0008_alter_user_username_max_length                      | 2022-03-28 17:45:15.989051 |
| 14 | auth         | 0009_alter_user_last_name_max_length                     | 2022-03-28 17:45:16.086009 |
| 15 | auth         | 0010_alter_group_name_max_length                         | 2022-03-28 17:45:16.125987 |
| 16 | auth         | 0011_update_proxy_permissions                            | 2022-03-28 17:45:16.140977 |
| 17 | auth         | 0012_alter_user_first_name_max_length                    | 2022-03-28 17:45:16.255906 |
| 18 | sessions     | 0001_initial                                             | 2022-03-28 17:45:16.308865 |
| 19 | taskapp      | 0001_initial                                             | 2022-03-28 17:45:16.354856 |
| 20 | taskapp      | 0002_band                                                | 2022-03-28 17:45:16.393835 |
| 21 | taskapp      | 0003_category                                            | 2022-03-28 17:45:16.438843 |
| 22 | taskapp      | 0004_alter_category_description                          | 2022-03-28 17:45:16.500810 |
| 23 | taskapp      | 0005_article                                             | 2022-03-28 17:45:16.542807 |
| 24 | taskapp      | 0006_album                                               | 2022-03-28 17:45:16.596777 |
| 25 | taskapp      | 0007_capitol_language_movie_framework_country_character  | 2022-03-28 17:45:17.217439 |
| 26 | taskapp      | 0008_album_band                                          | 2022-03-28 17:45:17.330310 |
+----+--------------+----------------------------------------------------------+----------------------------+
26 rows in set (0.00 sec)

mysql>
```

MYSQL CLI CLIENT - MYSQL
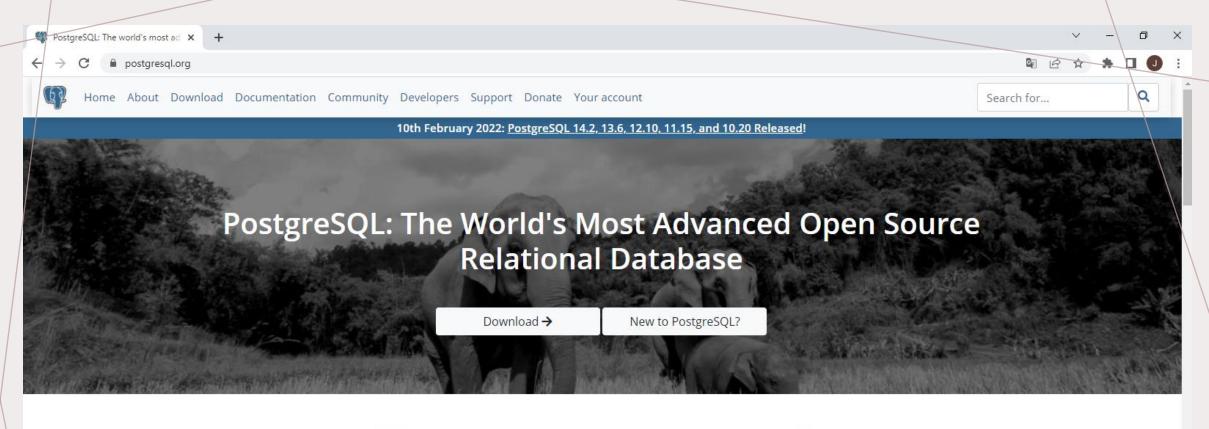
PostgreSQL

postgresql.org

Search for...

10th February 2022: PostgreSQL 14.2, 13.6, 12.10, 11.15, and 10.20 Released!

PostgreSQL: The World's Most Advanced Open Source Relational Database

Download →   New to PostgreSQL?

New to PostgreSQL?

PostgreSQL is a powerful, open source object-relational database system with over 30 years of active development that has earned it a strong reputation for reliability, feature robustness, and performance.
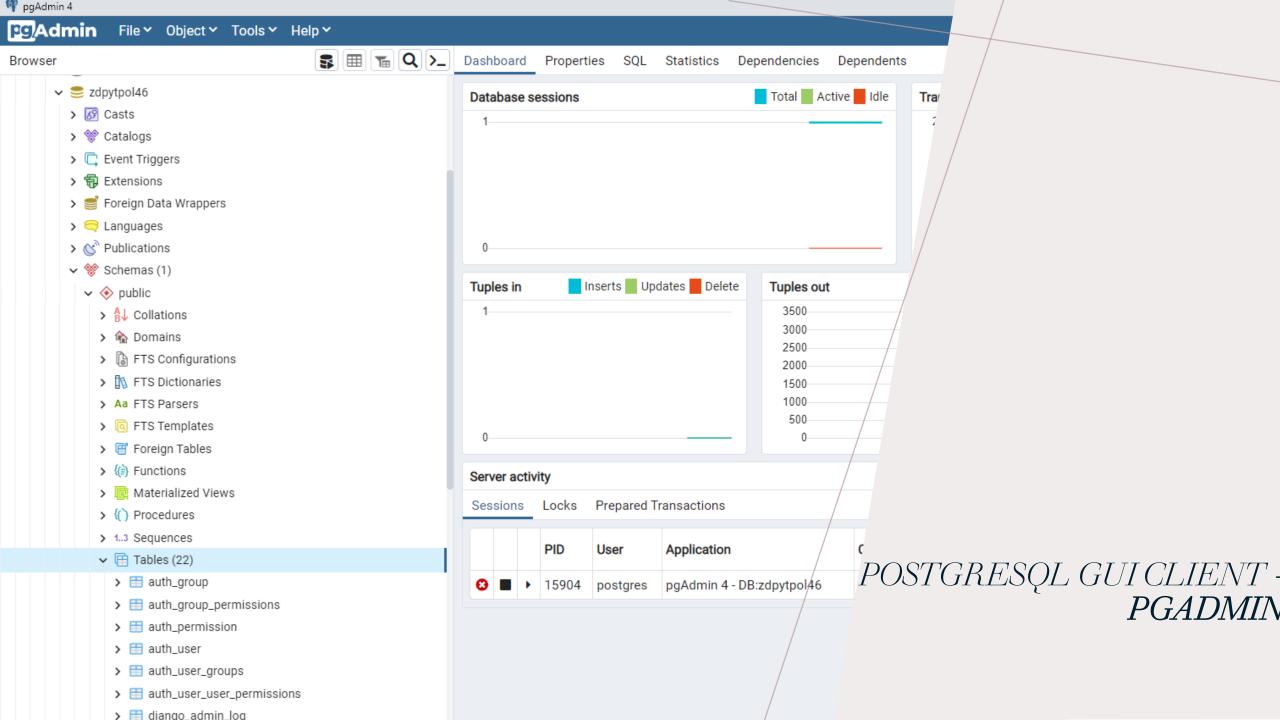
There is a wealth of information to be found describing how to **install** and **use** PostgreSQL through the **official documentation**. The PostgreSQL community provides many helpful places to become familiar with the technology, discover how it works, and find career
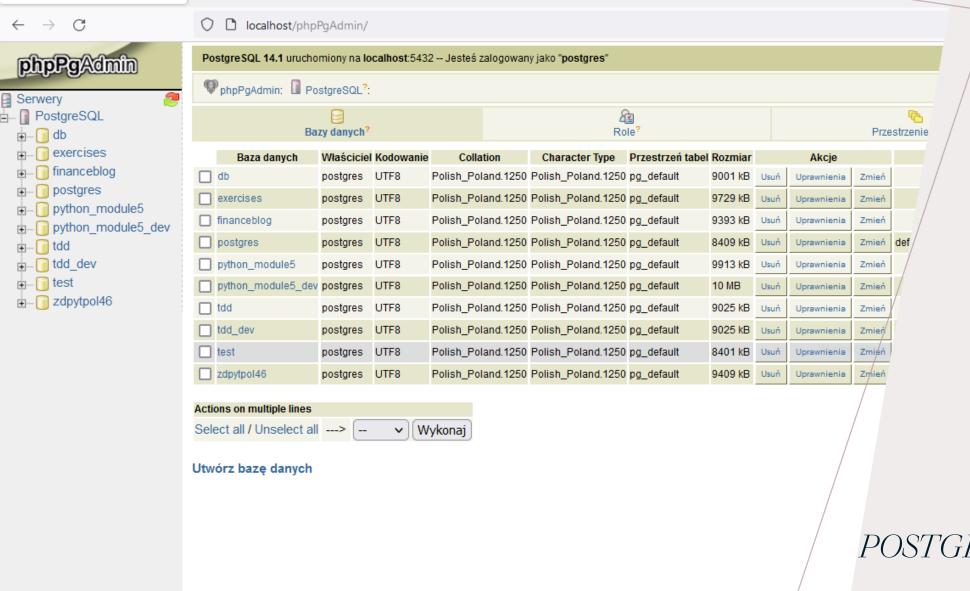
Latest Releases

2022-02-10 - PostgreSQL 14.2, 13.6, 12.10, 11.15, and 10.20 Released!

The PostgreSQL Global Development Group has **released an update** to all supported versions of our database system, including 14.2, 13.6, 12.10, 11.15, and 10.20. This release **fixes over 55 bugs** reported over the last three months.

For the full list of changes, please review the **release notes.**

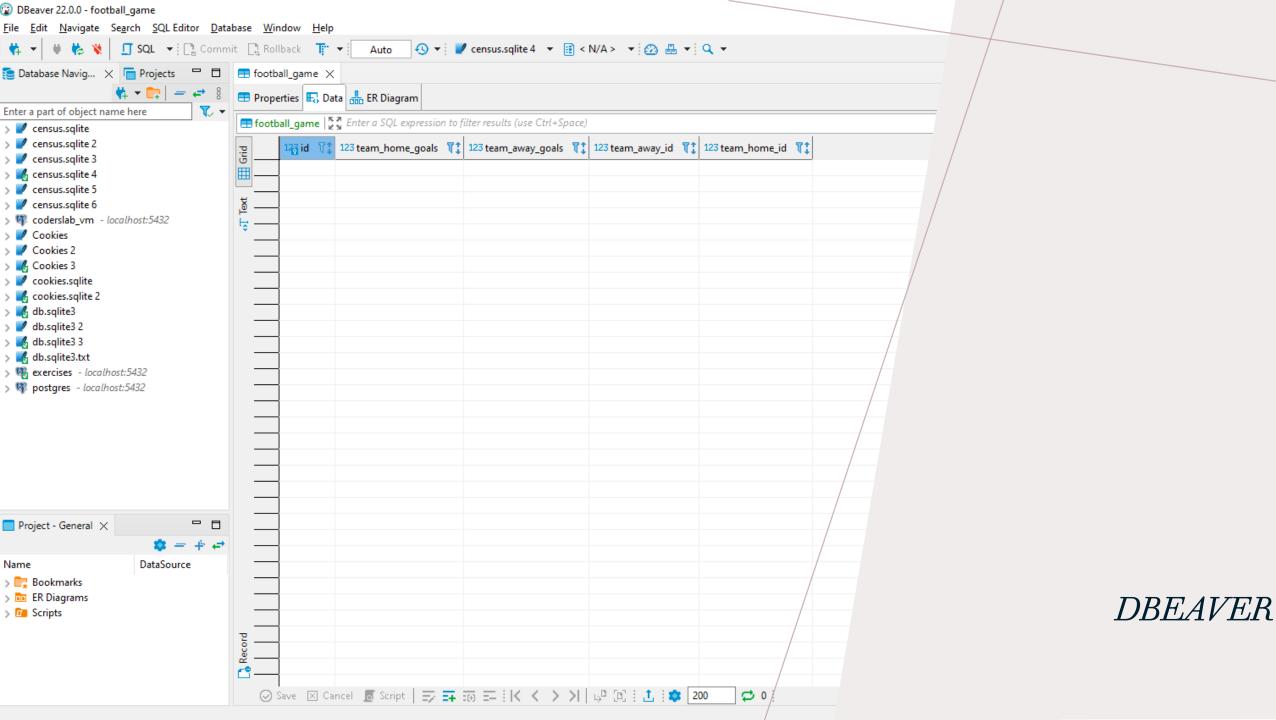POSTGRESQL GUI CLIENT -
PGADMIN

POSTGRESQL GUI CLIENT –
PHPPGADMIN

```
SQL Shell (psql)

Server [localhost]:
Database [postgres]:
Port [5432]:
Username [postgres]:
Password for user postgres:
psql (14.1)
WARNING: Console code page (852) differs from Windows code page (1250)
        8-bit characters might not work correctly. See psql reference
        page "Notes for Windows users" for details.
Type "help" for help.

postgres=# \c zdpytpol46
You are now connected to database "zdpytpol46" as user "postgres".
zdpytpol46=# select * from django_migrations;
 id |     app      |                        name                         |          applied
----+--------------+-----------------------------------------------------+-----------------------------
  1 | contenttypes | 0001_initial                                        | 2022-03-28 19:28:11.83978+02
  2 | auth         | 0001_initial                                        | 2022-03-28 19:28:12.010683+02
  3 | admin        | 0001_initial                                        | 2022-03-28 19:28:12.050658+02
  4 | admin        | 0002_logentry_remove_auto_add                       | 2022-03-28 19:28:12.068648+02
  5 | admin        | 0003_logentry_add_action_flag_choices               | 2022-03-28 19:28:12.07964+02
  6 | contenttypes | 0002_remove_content_type_name                        | 2022-03-28 19:28:12.116621+02
  7 | auth         | 0002_alter_permission_name_max_length               | 2022-03-28 19:28:12.128614+02
  8 | auth         | 0003_alter_user_email_max_length                    | 2022-03-28 19:28:12.142609+02
  9 | auth         | 0004_alter_user_username_opts                       | 2022-03-28 19:28:12.153598+02
 10 | auth         | 0005_alter_user_last_login_null                     | 2022-03-28 19:28:12.164591+02
 11 | auth         | 0006_require_contenttypes_0002                      | 2022-03-28 19:28:12.166591+02
 12 | auth         | 0007_alter_validators_add_error_messages            | 2022-03-28 19:28:12.176586+02
 13 | auth         | 0008_alter_user_username_max_length                 | 2022-03-28 19:28:12.201572+02
 14 | auth         | 0009_alter_user_last_name_max_length                | 2022-03-28 19:28:12.212564+02
 15 | auth         | 0010_alter_group_name_max_length                    | 2022-03-28 19:28:12.234551+02
 16 | auth         | 0011_update_proxy_permissions                       | 2022-03-28 19:28:12.245545+02
 17 | auth         | 0012_alter_user_first_name_max_length               | 2022-03-28 19:28:12.25454+02
 18 | sessions     | 0001_initial                                        | 2022-03-28 19:28:12.279527+02
 19 | taskapp      | 0001_initial                                        | 2022-03-28 19:28:12.287522+02
 20 | taskapp      | 0002_band                                           | 2022-03-28 19:28:12.303513+02
 21 | taskapp      | 0003_category                                       | 2022-03-28 19:28:12.322503+02
 22 | taskapp      | 0004_alter_category_description                     | 2022-03-28 19:28:12.3295+02
 23 | taskapp      | 0005_article                                        | 2022-03-28 19:28:12.351487+02
 24 | taskapp      | 0006_album                                          | 2022-03-28 19:28:12.362479+02
 25 | taskapp      | 0007_capitol_language_movie_framework_country_character | 2022-03-28 19:28:12.453437+02
 26 | taskapp      | 0008_album_band                                     | 2022-03-28 19:28:12.467426+02
(26 rows)


zdpytpol46=#
```

POSTGRESQL CLI CLIENT - PSQL

KLIENCI OGOLNEGO PRZEZNACZENIA

File   Edit   Navigate   Search   SQL Editor   Database   Window   Help

SQL | Auto | census.sqlite 4 | < N/A >

Database Navig... | Projects

football_game

Properties | Data | ER Diagram

football_game | Enter a SQL expression to filter results (use Ctrl+Space)

Enter a part of object name here

- census.sqlite
- census.sqlite 2
- census.sqlite 3
- census.sqlite 4
- census.sqlite 5
- census.sqlite 6
- coderslab_vm   - localhost:5432
- Cookies
- Cookies 2
- Cookies 3
- cookies.sqlite
- cookies.sqlite 2
- db.sqlite3
- db.sqlite3 2
- db.sqlite3 3
- db.sqlite3.txt
- exercises   - localhost:5432
- postgres   - localhost:5432

123 id	123 team_home_goals	123 team_away_goals	123 team_away_id	123 team_home_id

Project - General

Name | DataSource

- Bookmarks
- ER Diagrams
- Scripts

Save   Cancel   Script | 200 | 0

DBEAVER
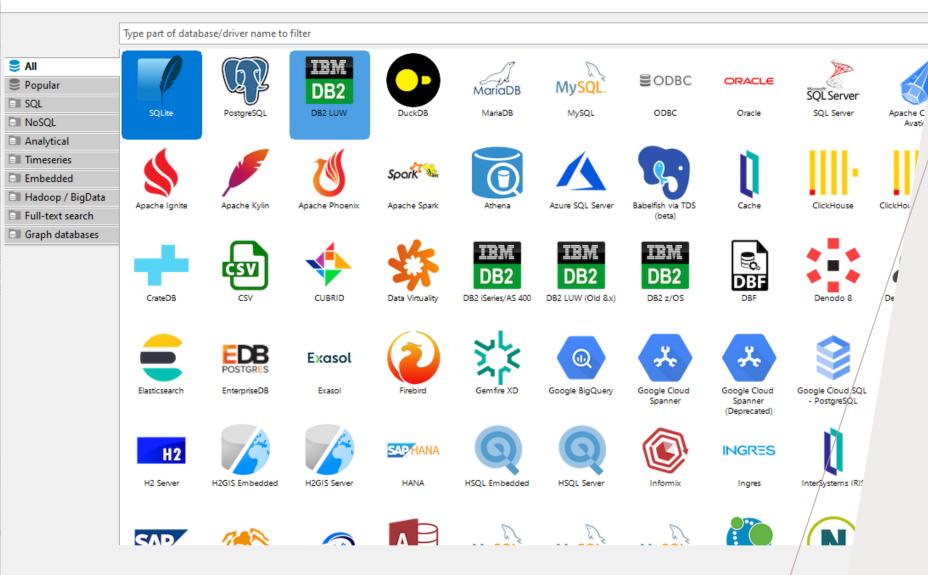
Connect to a database

Select your database

Create new database connection. Find your database driver in the list below.

Type part of database/driver name to filter

- All
- Popular
- SQL
- NoSQL
- Analytical
- Timeseries
- Embedded
- Hadoop / BigData
- Full-text search
- Graph databases

SQLite	PostgreSQL	DB2 LUW	DuckDB	MariaDB	MySQL	ODBC	Oracle	SQL Server	Apache C Avati
Apache Ignite	Apache Kylin	Apache Phoenix	Apache Spark	Athena	Azure SQL Server	Babelfish via TDS (beta)	Cache	ClickHouse	ClickHo
CrateDB	CSV	CUBRID	Data Virtuality	DB2 iSeries/AS 400	DB2 LUW (Old 8.x)	DB2 z/OS	DBF	Denodo 8	De
Elasticsearch	EnterpriseDB	Exasol	Firebird	Gemfire XD	Google BigQuery	Google Cloud Spanner	Google Cloud Spanner (Deprecated)	Google Cloud SQL - PostgreSQL	
H2 Server	H2GIS Embedded	H2GIS Server	HANA	HSQL Embedded	HSQL Server	Informix	Ingres	InterSystems IRIS	

Test Connection ...

DBEAVER

DB Browser

Oracle
MySQL
PostgreSQL
SQLite
Custom...

Import TNS Names

Nothing to show

Object properties: (no object selected)

Search Everywhere Double Shift

Project View Alt+1

Go to File Ctrl+Shift+N

Recent Files Ctrl+E

Navigation Bar Alt+Home

Drop files here to open them

PYCHARM
DATABASE NAVIGATOR

Terminal: Local +

C:\Users\jerem\PycharmProjects\WAR_PYT_S_29_OOP\03_Dzien_02\02_Polimorfizm\01_Zadanie_1

Git TODO Problems Python Packages Python Console Terminal

Connection › Consoles › Connection

DB Browser

Connection Sessions | Connection

public ▾   Main ▾   ▶   Auto-Commit OFF - connected

```
1  select * from django_migrations;
```

Connection
- Schemas (4)
  - information_schema
  - pg_catalog
  - pg_toast
  - public
    - Tables (11)
      - auth_group
      - auth_group_permissions
      - auth_permission
      - auth_user
      - auth_user_groups
      - auth_user_user_permissions
      - django_admin_log
      - django_content_type
      - django_migrations

Table: django_migrations

Schema	public
Connection	Connection

DB Execution Console

	id	app	name	applied
1	1	contenttypes	0001_initial	23 cze 2022, 17:00:35
2	2	auth	0001_initial	23 cze 2022, 17:00:35
3	3	admin	0001_initial	23 cze 2022, 17:00:35
4	4	admin	0002_logentry_remove_auto_add	23 cze 2022, 17:00:35
5	5	admin	0003_logentry_add_action_flag_choices	23 cze 2022, 17:00:35
6	6	contenttypes	0002_remove_content_type_name	23 cze 2022, 17:00:35
7	7	auth	0002_alter_permission_name_max_length	23 cze 2022, 17:00:35
8	8	auth	0003_alter_user_email_max_length	23 cze 2022, 17:00:35
9	9	auth	0004_alter_user_username_opts	23 cze 2022, 17:00:35
10	10	auth	0005_alter_user_last_login_null	23 cze 2022, 17:00:35

Connection (main): 19 records - executed in 9 ms. / fetched in 1 ms.

Messages | Result 3 | Result 4 | Result 5

Git | TODO | Problems | Python Packages | DB Execution Console | Python Console | Terminal
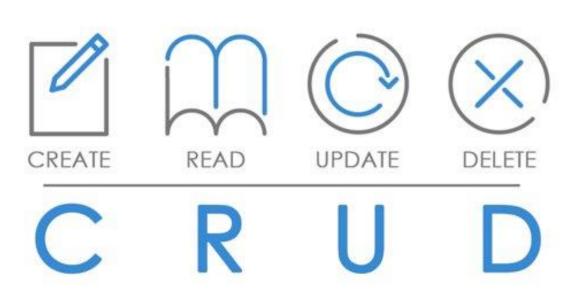
PYCHARM
DATABASE NAVIGATOR

PODSTAWOWE INSTRUKCJE SQL

- **DDL** – Data Definition Language
- **DML** – Data Manipulation Language
- **DQL** – Data Query Language
- **DCL** – Data Control Language
- **TCL** – Transaction Control Language

CREATE READ UPDATE DELETE

CRUD

```
1   INSERT INTO mdb.employee (name, age, nationality)
2   VALUES ('John', '26', 'Germany');
```
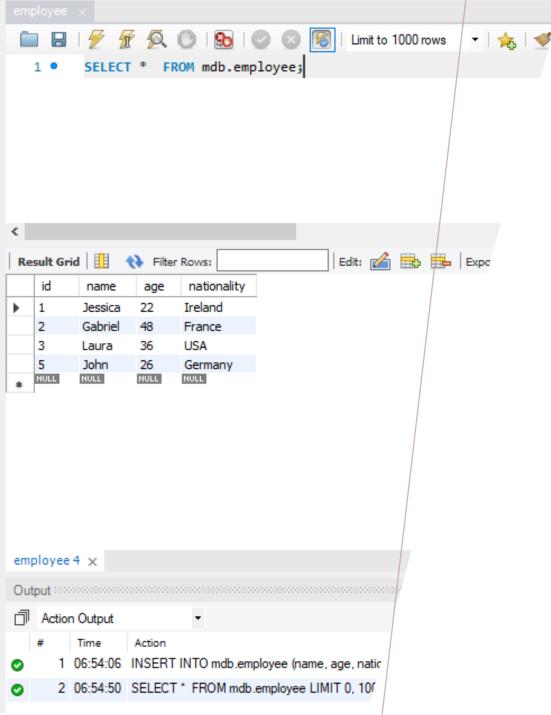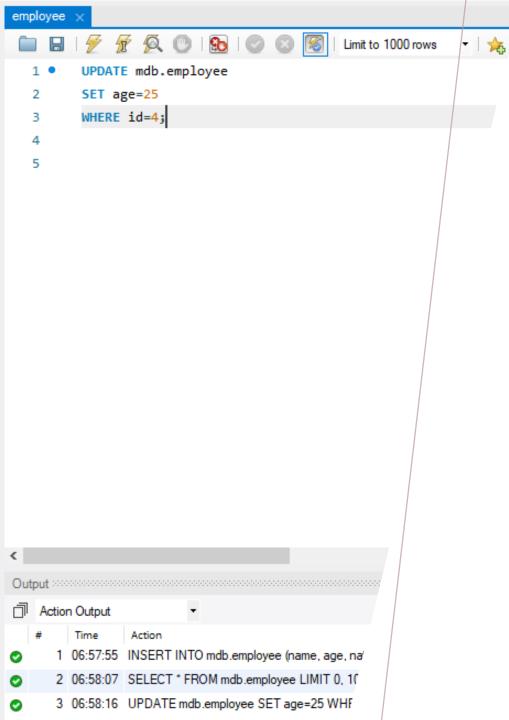
C - Create (DML)

INSERT INTO *table_name* (*column1, column2, column3, ...*)
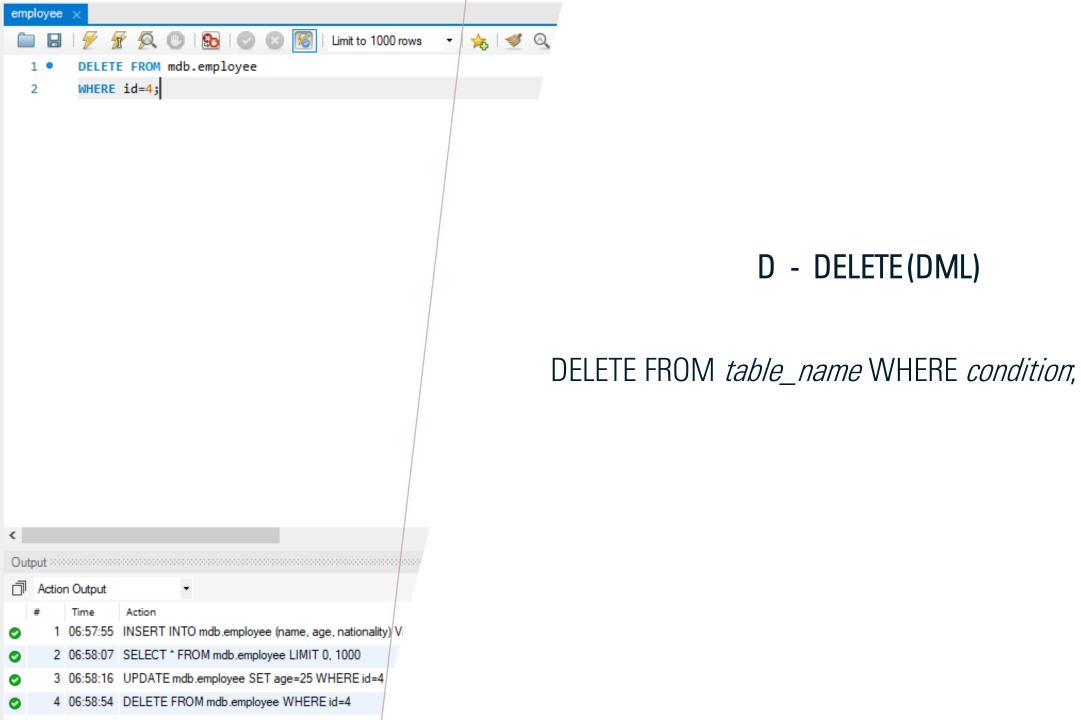VALUES (*value1, value2, value3, ...*);

R - Read (DQL)

SELECT *column1, column2, ...*
FROM table_name;

```
1 ●   UPDATE mdb.employee
2     SET age=25
3     WHERE id=4;
4
5
```

#	Time	Action
● 1	06:57:55	INSERT INTO mdb.employee (name, age, na/
● 2	06:58:07	SELECT * FROM mdb.employee LIMIT 0, 10
● 3	06:58:16	UPDATE mdb.employee SET age=25 WHF

U – UPDATE (DML)

UPDATE *table_name*
SET column1 = value1, column2 = value2, ...
WHERE *condition*;

Limit to 1000 rows

```
1 ● DELETE FROM mdb.employee
2   WHERE id=4;
```

D - DELETE(DML)

DELETE FROM *table_name* WHERE *condition*,

Output

Action Output

#	Time	Action
✔ 1	06:57:55	INSERT INTO mdb.employee (name, age, nationality) V/
✔ 2	06:58:07	SELECT * FROM mdb.employee LIMIT 0, 1000
✔ 3	06:58:16	UPDATE mdb.employee SET age=25 WHERE id=4
✔ 4	06:58:54	DELETE FROM mdb.employee WHERE id=4

ZLACZENIA

ZLACZENIA (JOINS)

- INNER JOIN
  - Self-join
- OUTER JOIN
  - LEFT JOIN
  - RIGHT JOIN
  - FULL JOIN
- CROSS JOIN
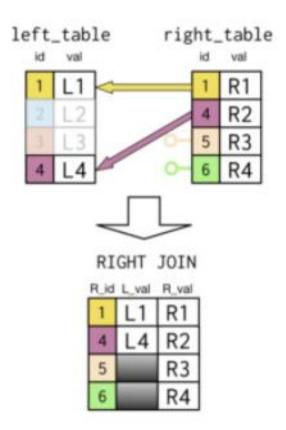- Semi-join / Anti-join
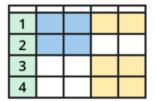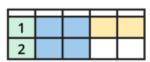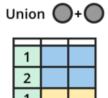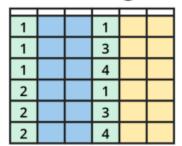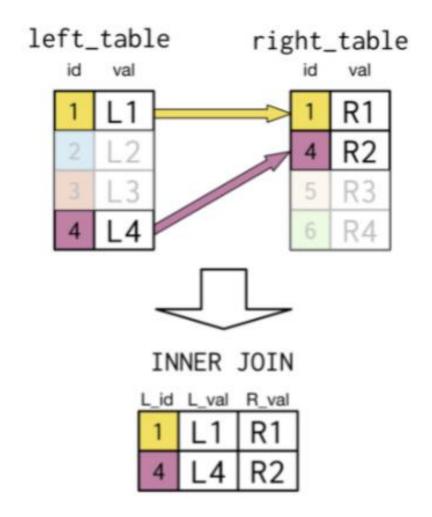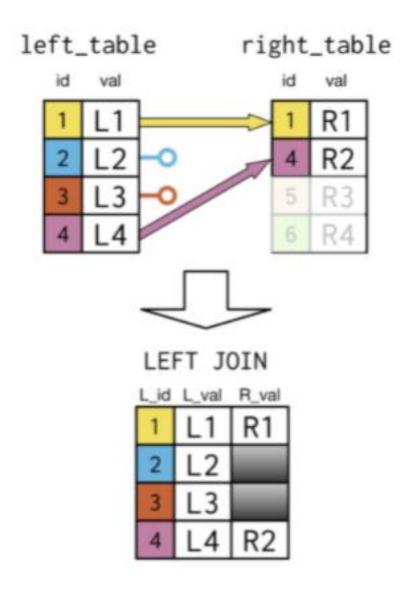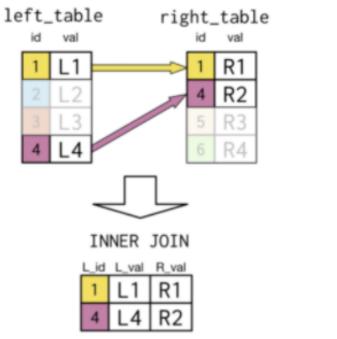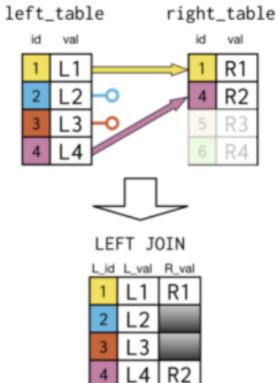
INNER JOIN
(AKA JOIN)

LEFT JOIN
(AKA LEFT OUTER JOIN)

INNER JOIN vs LEFT JOIN

INNER JOIN VS LEFT JOIN

```
SELECT right_table.id AS R_id,
       left_table.val AS L_val,
       right_table.val AS R_val
FROM left_table
RIGHT JOIN right_table
ON left_table.id = right_table.id;
```
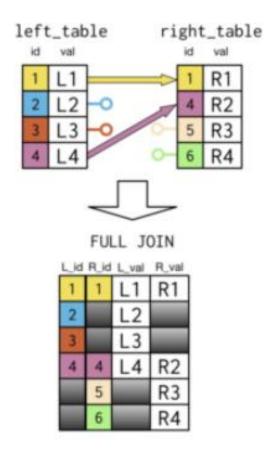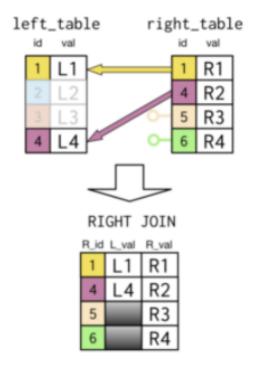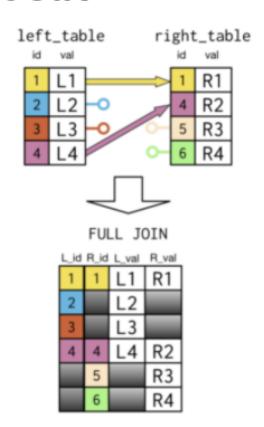
RIGHT JOIN
(AKA RIGHT OUTER JOIN)

```
SELECT left_table.id AS L_id,
       right_table.id AS R_id,
       left_table.val AS L_val,
       right_table.val AS R_val
FROM left_table
FULL JOIN right_table
USING (id);
```

FULL JOIN
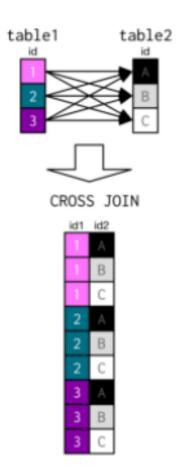*(AKA FULL OUTER JOIN)*

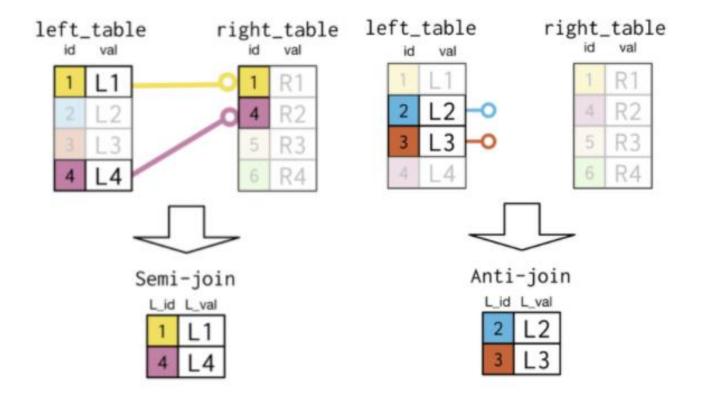RIGHT JOIN vs FULL JOIN

RIGHT JOIN VS FULL JOIN

CROSS JOIN with code


```
SELECT table1.id AS id1,
        table2.id AS id2
FROM table1
CROSS JOIN table2;
```

CROSS JOIN
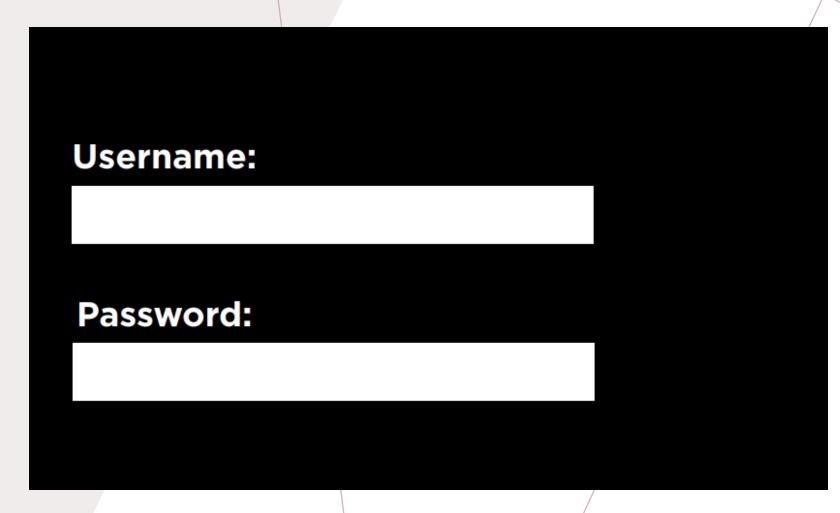
Semi-join and anti-join diagrams

SEMI-JOIN
ANTI-JOIN

INDEKSY

INDEKSY

ID	TOWAR
1	Herbata
2	Kawa
3	Cukier
4	Mleko
5	Ciastka
6	Owoce
7	Napoje

INDEKSY

SQL INJECTION

SQL INJECTION

Username:

Password:

SQL INJECTION

```
SELECT * FROM users
WHERE username = username AND password = password;
```

SQL INJECTION

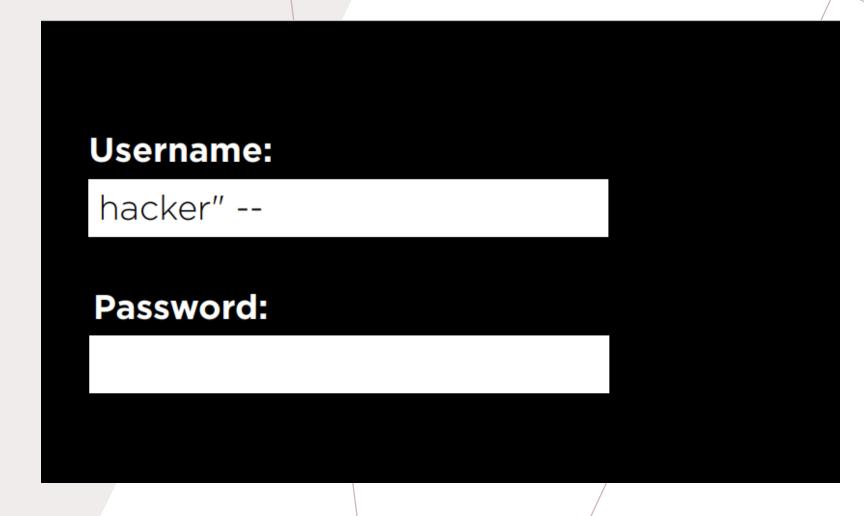**Username:**

harry

Password:

12345

SQL INJECTION

```
SELECT * FROM users
WHERE username = username AND password = password;
```

SQL INJECTION

```
SELECT * FROM users
WHERE username = "harry" AND password = "12345";
```

SQL INJECTION

Username:

hacker" --

Password:

SQL INJECTION

```
SELECT * FROM users
WHERE username = username AND password = password;
```

SQL INJECTION

```
SELECT * FROM users
WHERE username = "hacker"--" AND password = "";
```

SQL INJECTION


```
SELECT * FROM users
WHERE username = "hacker"--" AND password = "";
```