Stranger SQL

Philipp Salvisberg
21st November 2024

Wife

Darling, can you please go to the shop buy one bottle of milk and if they have eggs, get a dozen!

Gladly, I'll be right back.

Husband,
Working in IT

30 minutes later.

Why on earth did you get 12 bottles of milk?

Well… they had eggs.

Source: https://newengineer.com/blog/10-jokes-only-engineers-will-find-funny-1111728

Welcome

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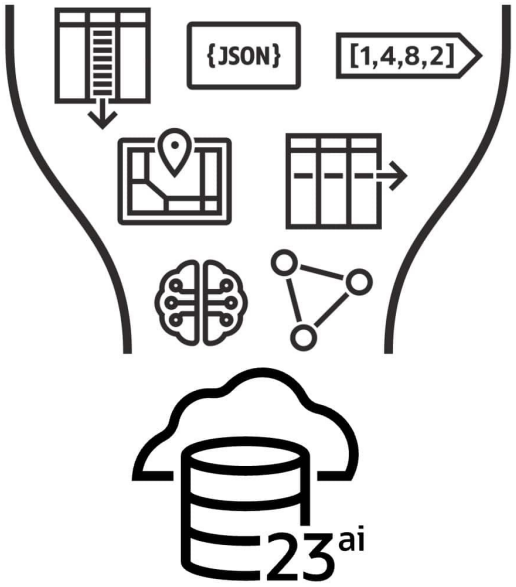
Why This Talk?

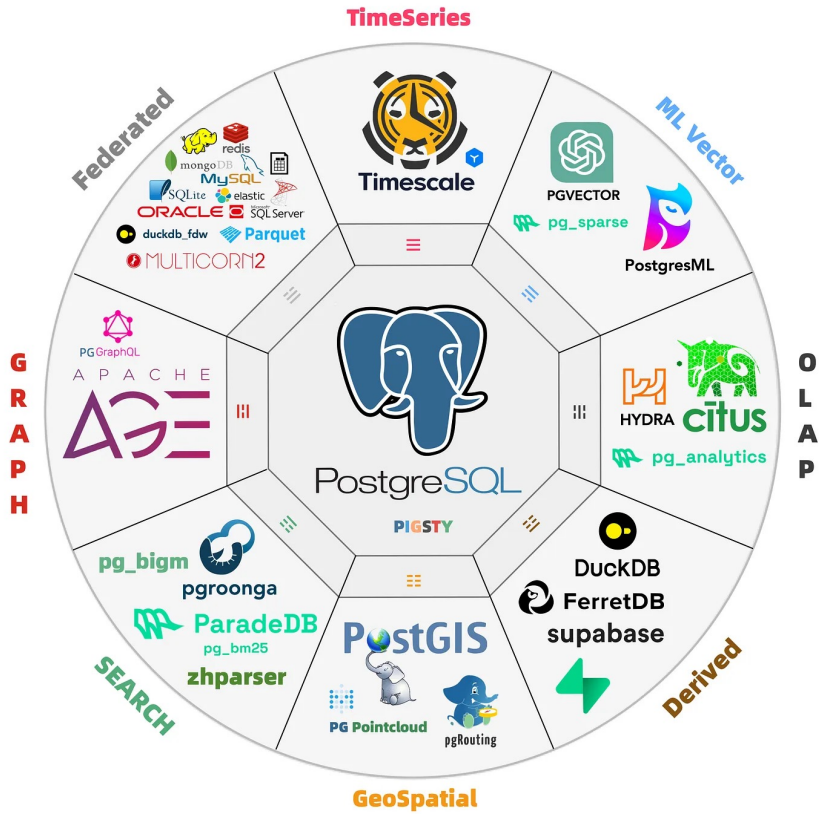
IslandSQL – Parser for SQL Scripts

Oracle Database 23ai



https://blogs.oracle.com/database/post/oracle-database-23ai-now-available-in-the-cloud

PostgreSQL 16/17



https://medium.com/@fengruohang/postgres-is-eating-the-database-world-157c204dcfc4

Comments

--

/* */

Setup


```
create table if not exists dept as select * from (values
          (10, 'ACCOUNTING', 'NEW YORK'),
          (20, 'RESEARCH',   'DALLAS'),
          (30, 'SALES',      'CHICAGO'),
          (40, 'OPERATIONS', 'BOSTON')
      ) s (deptno, dname, loc);

create table if not exists emp as select * from (values
          (7839, 'KING',   'PRESIDENT', null, date '1981-11-17', 5000, null, 10),
          (7566, 'JONES',  'MANAGER',   7839, date '1981-04-02', 2975, null, 20),
          (7698, 'BLAKE',  'MANAGER',   7839, date '1981-05-01', 2850, null, 30),
          (7782, 'CLARK',  'MANAGER',   7839, date '1981-06-09', 2450, null, 10),
          (7788, 'SCOTT',  'ANALYST',   7566, date '1987-04-19', 3000, null, 20),
          (7902, 'FORD',   'ANALYST',   7566, date '1981-12-03', 3000, null, 20),
          (7499, 'ALLEN',  'SALESMAN',  7698, date '1981-02-20', 1600,  300, 30),
          (7521, 'WARD',   'SALESMAN',  7698, date '1981-02-22', 1250,  500, 30),
          (7654, 'MARTIN', 'SALESMAN',  7698, date '1981-09-28', 1250, 1400, 30),
          (7844, 'TURNER', 'SALESMAN',  7698, date '1981-09-08', 1500,    0, 30),
          (7900, 'JAMES',  'CLERK',     7698, date '1981-12-03',  950, null, 30),
          (7934, 'MILLER', 'CLERK',     7782, date '1982-01-23', 1300, null, 10),
          (7369, 'SMITH',  'CLERK',     7902, date '1980-12-17',  800, null, 20),
          (7876, 'ADAMS',  'CLERK',     7788, date '1987-05-23', 1100, null, 20)
      ) s (empno, ename, job, mgr, hiredate, sal, comm, deptno);
```

Nested Multiline Comment

OracleDB

```
/*
   A nested multi-line comment:

   /* the next statement should
      not be executed, right? */

   drop table emp;
*/
select count(*) from emp;
```

```
Table EMP dropped.

Error starting at line : 8 in command -

*/

Error report -

Unknown Command
```

PostgreSQL

```
/*
   A nested multi-line comment:

      /* the next statement should
         not be executed, right? */

   drop table emp;
*/
select count(*) from emp;
```


```
 count
-------
    14
(1 row)
```

Unterminated, Nested Comment

OracleDB

```
/*
   A nested multi-line comment:

   /* the next statement should
      not be executed, right?

drop table emp;
*/
select count(*) from emp;
```

```
 COUNT(*)
----------
        14
```

PostgreSQL

```
/*
   A nested multi-line comment:

   /* the next statement should
      not be executed, right?

drop table emp;
*/
select count(*) from emp;
```

```
(no result, waiting for the comment
to be terminated)
```

Quoted Identifiers

Unquoted vs. Quoted Identifiers

```
-- setup
drop table if exists t;
create table t as
select * from (values
   ('lower', 'UPPER')
) as s("a", "A");

-- demo
select a   as c1,
       A   as c2,
       "a" as c3,
       "A" as c4
  from t;
```

```
select * from t;
```

a	A
lower	UPPER

What's the result of c1, c2?

OracleDB

```
-- setup
drop table if exists t;
create table t as
select * from (values
   ('lower', 'UPPER')
) as s("a", "A");

-- demo
select a   as c1,
       A   as c2,
       "a" as c3,
       "A" as c4
  from t;
```

```
C1    C2    C3    C4
----- ----- ----- -----
UPPER UPPER lower UPPER
```

SQL:2023

PostgreSQL

```
-- setup
drop table if exists t;
create table t as
select * from (values
   ('lower', 'UPPER')
) as s("a", "A");

-- demo
select a   as c1,
       A   as c2,
       "a" as c3,
       "A" as c4
  from t;
```

```
  c1   |  c2   |  c3   |  c4
-------+-------+-------+-------
 lower | lower | lower | UPPER
(1 row)
```

Identifiers & Operators

What's the Result of C2?

OracleDB

```
-- setup
drop table if exists t;
create table t as
select * from (values
   (1, 2, 41, 42)
) as s(a, b, "a#b", "A#B");

-- demo
select a-b as c1,
       a#b as c2
  from t;
```

```
 C1          C2
---------- ----------
        -1         42
```

PostgreSQL

```
-- setup
drop table if exists t;
create table t as
select * from (values
   (1, 2, 41, 42)
) as s(a, b, "a#b", "A#B");

-- demo
select a-b as c1,
       a#b as c2
  from t;
```

```
 c1 | c2
----+----
 -1 |  3
(1 row)
```

Characters in Unquoted Identifiers

Character Group	First Character			Subsequent Characters		
	OracleDB	PostgreSQL	SQL:2023	OracleDB	PostgreSQL	SQL:2023
Latin Letter (A-Z, a-z)	✅	✅	✅	✅	✅	✅
Digit (0-9)	⛔	⛔	⛔	✅	✅	✅
Hash Symbol (#)	⛔	⛔	⛔	✅	⛔	⛔
Underscore (_)	⛔	✅	⛔	✅	✅	✅
Dollar Sign ($)	⛔	⛔	⛔	✅	✅	⛔
Other Letter (äàáψ, ...)	✅	✅	⛔	✅	✅	⛔
Emoji (😀😎🤓, ...)	⛔	✅	⛔	⛔	✅	⛔

Keywords & Identifiers

What's "wrong"?

OracleDB

```
select count(*) as wrong_count
  from (select * from emp)
 wrong join dept using (deptno);
```

```
WRONG_COUNT
-----------
         14
```

PostgreSQL

```
select count(*) as wrong_count
  from (select * from emp)
 wrong join dept using (deptno);
```

```
 wrong_count
-------------
          14
(1 row)
```

What's "right"?

OracleDB

```
select count(*) as right_count
  from (select * from emp)
 right join dept using (deptno);
```

```
RIGHT_COUNT
-----------
         15
```

PostgreSQL

```
select count(*) as right_count
  from (select * from emp)
 right join dept using (deptno);
```

```
 right_count
-------------
          15
(1 row)
```

What's "right" Now?

OracleDB

```
with right as (select * from emp)
select count(*) as right_count
  from right right
 right join dept using (deptno);
```

```
RIGHT_COUNT
-----------
         15
```

PostgreSQL

```
with right as (select * from emp)
select count(*) as right_count
  from right right
 right join dept using (deptno);
```

```
ERROR:  syntax error at or near "right"
LINE 1: with right as (select * from emp)
```

String Literals

OracleDB

```
select 'Hello World!';

select 'Hello '
       'World!';

select 'Hello ' || 'World!';
```

```
'HELLOWORLD!
------------
Hello World!

Error starting at line : 3 in command -
select 'Hello '
       'World!'
Error at Command Line : 4 Column : 8
Error report -
SQL Error: ORA-00923: FROM keyword not found
where expected

'HELLO'||'WO
------------
Hello World!
```

PostgreSQL

```
select 'Hello World!';

select 'Hello '
       'World!';

select 'Hello ' || 'World!';
```

```
   ?column?
--------------
 Hello World!
(1 row)

   ?column?
--------------
 Hello World!
(1 row)

   ?column?
--------------
 Hello World!
(1 row)
```

Apostrophe in String

```
select '1: '' 2: '''' 3: ''''''' as str;
```

SQL:2023

```
STR
----------------
1: ' 2: '' 3: '''
```

Is there a better way?

OracleDB

```
select q'[1: ' 2: '' 3: ''']' as str;
select q'(1: ' 2: '' 3: ''')' as str;
select q'{1: ' 2: '' 3: '''}' as str;
select q'<1: ' 2: '' 3: '''>' as str;
select q'~1: ' 2: '' 3: '''~' as str;
select q'#1: ' 2: '' 3: '''#' as str;
select q'@1: ' 2: '' 3: '''@' as str;
select q'$1: ' 2: '' 3: '''$' as str;
select q'£1: ' 2: '' 3: '''£' as str;
select q'"1: ' 2: '' 3: '''"' as str;
select q'|1: ' 2: '' 3: '''|' as str;
select q'!1: ' 2: '' 3: '''!' as str;
select q'+1: ' 2: '' 3: '''+' as str;
select q'/1: ' 2: '' 3: '''/' as str;
select q'§1: ' 2: '' 3: '''§' as str;
select q'ß1: ' 2: '' 3: '''ß' as str;
select q'Й1: ' 2: '' 3: '''Й' as str;
select q'Ω1: ' 2: '' 3: '''Ω' as str;
select q'あ1: ' 2: '' 3: '''あ' as str;
```

```
STR
----------------
1: ' 2: '' 3: '''
```

PostgreSQL

```
select $$1: ' 2: '' 3: '''$$ as str;
select $id$1: ' 2: '' 3: '''$id$ as str;
select $name$1: ' 2: '' 3: '''$name$ as str;
select $😀$1: ' 2: '' 3: '''$😀$ as str;
```

```
 str
--------------------
 1: ' 2: '' 3: '''
(1 row)
```

Generating SQL

OracleDB – SQLcl

```
set heading off
spool x.sql
select q'[select q'(That's cool!)';]';
spool off
set heading on
@x.sql
```

```
SQL> select q'[select q'(That's cool!)';]';

select q'(That's cool!)';

SQL> spool off
SQL> set heading on
SQL> @x.sql

Q'(THAT'SCOO
------------
That's cool!
```

PostgreSQL – psql

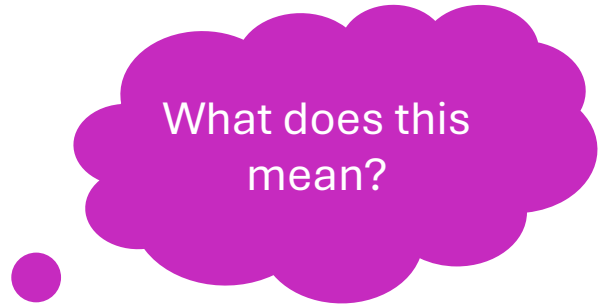
```
\set ECHO queries
select $$select $i$That's cool!$i$;$$\gexec
```

```
select $$select $i$That's cool!$i$;$$
select $i$That's cool!$i$;
   ?column?
--------------
 That's cool!
(1 row)
```

Data Types

Common OracleDB Data Types

OracleDB	PostgreSQL	Notes
blob	bytea	
char	**char**	Same semantics
clob	text	
date	**date**	Date without time
	timestamp(0)	Date with time, no sub seconds
json	**json**	non-binary JSON
	jsonb	binary JSON
number	decimal	
sdo_geometry	geometry	
timestamp	**timestamp**	Same semantics
varchar	**varchar**	'' vs. NULL
varchar2	varchar	
xmltype	xml	



OracleDB

```
with
   t (name, c1) as (values
      ('null' , null),
      ('empty', ''  )
   )
select name,
       c1,
       c1 = '' as is_empty,
       case
          when c1 is null then
             'is null'
          else
             'is not null'
       end as result
  from t;
```

```
NAME  C1   IS_EMPTY RESULT
----- -- ---------- -----------
null                is null
empty               is null
```

PostgreSQL

```
with
   t (name, c1) as (values
      ('null' , null),
      ('empty', ''  )
   )
select name,
       c1,
       c1 = '' as is_empty,
       case
          when c1 is null then
             'is null'
          else
             'is not null'
       end as result
  from t;
```

```
 name  | c1 | is_empty |   result
-------+----+----------+-------------
 null  |    |          | is null
 empty |    | t        | is not null
(2 rows)
```

SQL:2023

Functions

Substr

OracleDB

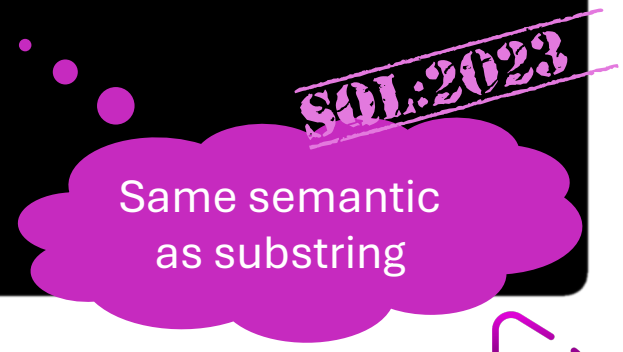
```
with
   t(c1) as (values
      ('Hello World!')
   )
select substr(c1,  1, 5) one,
       substr(c1,  0, 5) zero,
       substr(c1, -6, 5) negative
  from t;
```

```
ONE   ZERO  NEGAT
----- ----- -----
Hello Hello World
```

PostgreSQL

```
with
   t(c1) as (values
      ('Hello World!')
   )
select substr(c1,  1, 5) one,
       substr(c1,  0, 5) zero,
       substr(c1, -6, 5) negative
  from t;
```

```
  one   | zero | negative
--------+------+----------
 Hello  | Hell |
(1 row)
```



Greatest, Least

OracleDB

```
select greatest(null, 1, 2) as highest,
       least(null, 1, 2)    as lowest;
```

```
HIGHEST LOWEST
------- ------
```

PostgreSQL

```
select greatest(null, 1, 2) as highest,
       least(null, 1, 2)    as lowest;
```

```
 highest | lowest
---------+--------
       2 |      1
(1 row)
```

User-Defined Functions (UDFs)

Function Definitions

OracleDB

```
create or replace function f (
   p1 in integer
) return varchar2 is
begin
   return to_char(p1);
end;
/

create or replace function f (
   p1 in date
) return varchar2 is
begin
   return to_char(p1, 'DD.MM.YYYY');
end;
/
```

```
Function F compiled

Function F compiled
```

PostgreSQL

```
create or replace function f (
   p1 in integer
) returns varchar language sql
return cast(p1 as varchar);

create or replace function f (
   p1 in date
) returns varchar language sql
return to_char(p1, 'DD.MM.YYYY');
```

```
CREATE FUNCTION
CREATE FUNCTION
```

Calling Previously Created UDFs

OracleDB

```
select f(date '2024-11-21');
select f(42);
```

```
F(DATE'2024-11-21')
-------------------
21.11.2024

Error starting at line : 14 in command -
select f(42)
Error at Command Line : 14 Column : 8
Error report -
SQL Error: ORA-06553: PLS-306: wrong number
or types of arguments in call to 'F'
```

PostgreSQL

```
select f(date '2024-11-21');
select f(42);
```

```
 f
------------
 21.11.2024
(1 row)

 f
----
 42
(1 row)
```

Function Identity

OracleDB

```
select object_name,
       object_type
  from user_objects
 where object_name = 'F';

drop function f;
```

```
OBJECT_NAME OBJECT_TYPE
----------- -----------
F           FUNCTION

Function F dropped.
```

Overloading for standalone functions, procedures using default values

PostgreSQL

```
select proname,
       pg_get_function_identity_arguments(oid)
  from pg_proc
 where proname = 'f';

drop function f(date);
drop function f(integer);
```

```
 proname | pg_get_function_identity_arguments
---------+------------------------------------
 f       | p1 integer
 f       | p1 date
(2 rows)

DROP FUNCTION
DROP FUNCTION
```

SQL:2023

Select Statement

Without Select-List

PostgreSQL

```
select from dept;
select;
```

```
--
(4 rows)

--
(1 row)
```

Exists Subquery without Select-List

PostgreSQL

```
select *
  from emp a
 where exists ( -- bosses only
          select
            from emp b
           where b.mgr = a.empno
       );
```

```
 empno | ename |    job    | mgr  |  hiredate  |   sal   | comm | deptno
-------+-------+-----------+------+------------+---------+------+--------
  7839 | KING  | PRESIDENT |      | 1981-11-17 | 5000.00 |      |     10
  7698 | BLAKE | MANAGER   | 7839 | 1981-05-01 | 2850.00 |      |     30
  7782 | CLARK | MANAGER   | 7839 | 1981-06-09 | 2450.00 |      |     10
  7566 | JONES | MANAGER   | 7839 | 1981-04-02 | 2975.00 |      |     20
  7902 | FORD  | ANALYST   | 7566 | 1981-12-03 | 3000.00 |      |     20
  7788 | SCOTT | ANALYST   | 7566 | 1987-04-19 | 3000.00 |      |     20
(6 rows)
```

Without Select Keyword

PostgreSQL

```
table dept;
 deptno |    dname     |    loc
--------+--------------+-----------
     10 | ACCOUNTING   | NEW YORK
     20 | RESEARCH     | DALLAS
     30 | SALES        | CHICAGO
     40 | OPERATIONS   | BOSTON
(4 rows)
```

It's a SELECT statement!

works also:

select * from (table dept);

Returning Clause

PostgreSQL

```
begin;
   update emp
      set sal = sal * 1.2
    where sal + coalesce(comm, 0) < 2000
returning empno,
          ename,
          cast(sal / 1.2 as int) as old_sal,
          sal as new_sal;
rollback;
```

```
BEGIN
 empno | ename  | old_sal | new_sal
-------+--------+---------+---------
  7499 | ALLEN  |    1600 | 1920.00
  7900 | JAMES  |     950 | 1140.00
  7844 | TURNER |    1500 | 1800.00
  7521 | WARD   |    1250 | 1500.00
  7934 | MILLER |    1300 | 1560.00
  7369 | SMITH  |     800 |  960.00
  7876 | ADAMS  |    1100 | 1320.00
(7 rows)

UPDATE 7
ROLLBACK
```

OracleDB

```
set serveroutput on size unlimited
declare
   cursor c1 is
      select empno,
             ename,
             sal as old_sal,
             sal as new_sal
        from emp;
   type t_row_type is table of c1%rowtype;
   t_row t_row_type;
begin
   update emp
      set sal = sal * 1.2
    where sal + coalesce(comm, 0) < 2000
   return empno, ename, old sal, new sal
     bulk collect into t_row;
   dbms_output.put_line(sql%rowcount || ' rows updated.');
   dbms_output.put_line(null);
   dbms_output.put_line('EMPNO ENAME  OLD_SAL NEW_SAL');
   dbms_output.put_line('----- ------ ------- -------');
   for i in t_row.first..t_row.last
   loop
      dbms_output.put_line(rpad(t_row(i).empno, 6)
         || rpad(t_row(i).ename, 7)
         || lpad(t_row(i).old_sal, 7)
         || ' '
         || lpad(t_row(i).new_sal, 7));
   end loop;
   rollback;
end;
/
```

Archiving (Without Partitioning)

PostgreSQL

```
begin;
drop table if exists emp_archive;
create table emp_archive as
select * from emp where false;

with
   del as (
      delete from emp a
        where not exists (select from emp b
                          where b.mgr = a.empno)
      returning *
   )
insert into emp_archive select * from del;

rollback;
```

```
BEGIN
NOTICE:  table "emp_archive" does not exist, skipping
DROP TABLE
SELECT 0
INSERT 0 8
ROLLBACK
```

OracleDB

```
drop table if exists emp_archive;
create table emp_archive as
select * from emp where false;

lock table emp, emp_archive
           in share row exclusive mode;
insert into emp_archive s
select * from emp a
 where not exists (select 42 from emp b
                   where b.mgr = a.empno);
delete from emp a
 where not exists (select 42 from emp b
                   where b.mgr = a.empno);

rollback;
```

```
Table EMP_ARCHIVE dropped.
Table EMP_ARCHIVE created.
Lock succeeded.
8 rows inserted.
8 rows deleted.
Rollback complete.
```

Transactions

Setup

OracleDB

```
drop table if exists t1;

create table t1 (
   id integer not null primary key
);

create or replace
procedure p1(in_id in integer) as
begin
   insert into t1 values (in_id);
end;
/
```

PostgreSQL

```
drop table if exists t1;

create table t1 (
   id integer not null primary key
);

create or replace
procedure p1(in_id in integer) as '
begin
   insert into t1 values (in_id);
end
' language plpgsql;
```

Rollback in UDF

OracleDB

```
set transaction read write; -- read committed
call p1(1);
call p1(1);
commit;
select * from t1;
```

```
Transaction READ succeeded.

Call completed.

ORA-00001: unique constraint ... violated...

Commit complete.

        ID
----------
         1
```

PostgreSQL

```
start transaction read write; -- read committed
call p1(1);
call p1(1);
commit;
select * from t1;
```

```
START TRANSACTION

CALL

ERROR:  duplicate key value...

ROLLBACK

 id
----
(0 rows)
```

Statement Level Rollback – Manually

PostgreSQL

```
start transaction read write; -- read committed
call p1(1);
savepoint before_insert;
call p1(1);
rollback to before_insert; -- cannot be done in exception block of p1
select * from t1;
```

```
START TRANSACTION
CALL
SAVEPOINT
ERROR:  duplicate key value violates unique constraint "t1_pkey"
DETAIL:  Key (id)=(1) already exists.
CONTEXT:  SQL statement "insert into t1 values (in_id)"
PL/pgSQL function p1(integer) line 3 at SQL statement
ROLLBACK
 id
----
  1
(1 row)
```

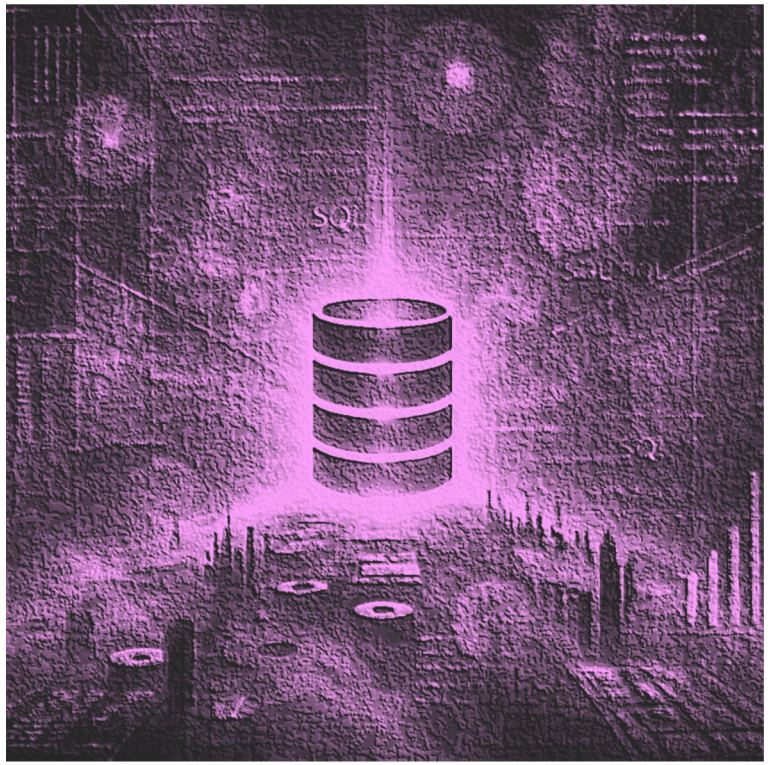
See also https://github.com/lzlabs/pg_statement_rollback

Core Messages

SQL Is Standardized, but ...

- Same
    - syntax
    - data type name
    - isolation level
    - etc.

  does not mean same behaviour across DBMSs.
- No compile error does not mean expected results.
- Does not spare you from **tests**, **tests**, **tests**.



Thank you!

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