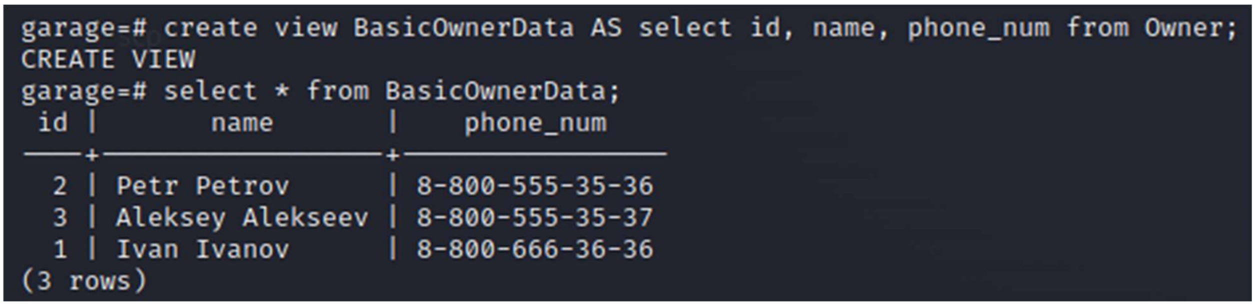
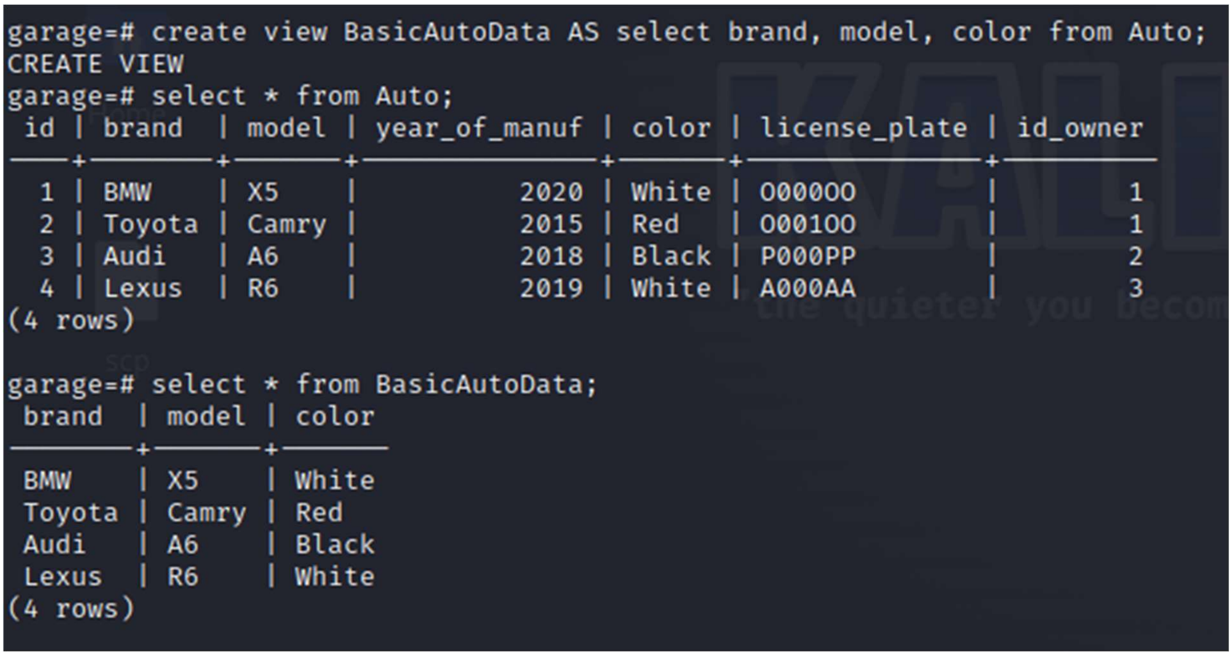
SQL-представления.

Использование представлений для скрытия столбцов

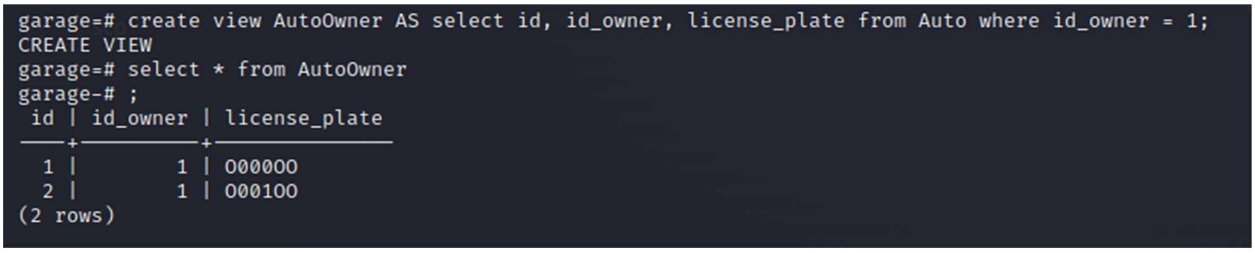


```
garage=# create view BasicOwnerData AS select id, name, phone_num from Owner;
CREATE VIEW
garage=# select * from BasicOwnerData;
 id |       name       |    phone_num
----+------------------+-----------------
  2 | Petr Petrov      | 8-800-555-35-36
  3 | Aleksey Alekseev | 8-800-555-35-37
  1 | Ivan Ivanov      | 8-800-666-36-36
(3 rows)
```



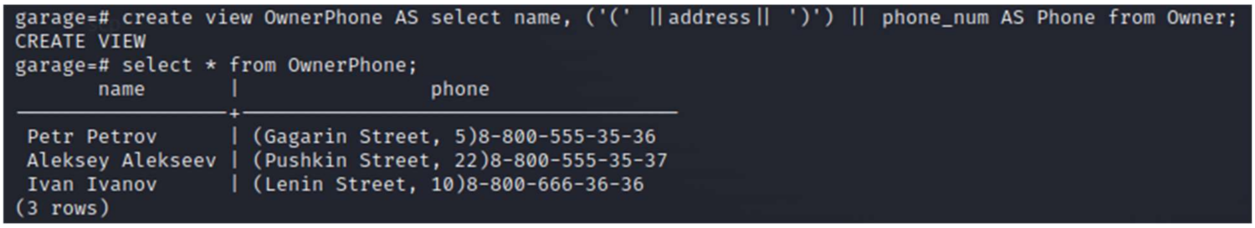
```
garage=# create view BasicAutoData AS select brand, model, color from Auto;
CREATE VIEW
garage=# select * from Auto;
 id | brand  | model | year_of_manuf | color | license_plate | id_owner
----+--------+-------+---------------+-------+---------------+----------
  1 | BMW    | X5    |          2020 | White | O000OO        |        1
  2 | Toyota | Camry |          2015 | Red   | O001OO        |        1
  3 | Audi   | A6    |          2018 | Black | P000PP        |        2
  4 | Lexus  | R6    |          2019 | White | A000AA        |        3
(4 rows)

garage=# select * from BasicAutoData;
 brand  | model | color
--------+-------+-------
 BMW    | X5    | White
 Toyota | Camry | Red
 Audi   | A6    | Black
 Lexus  | R6    | White
(4 rows)
```

Следующий оператор определяет представление, содержащее информацию только тех машин, у которых владелец имеет id 1



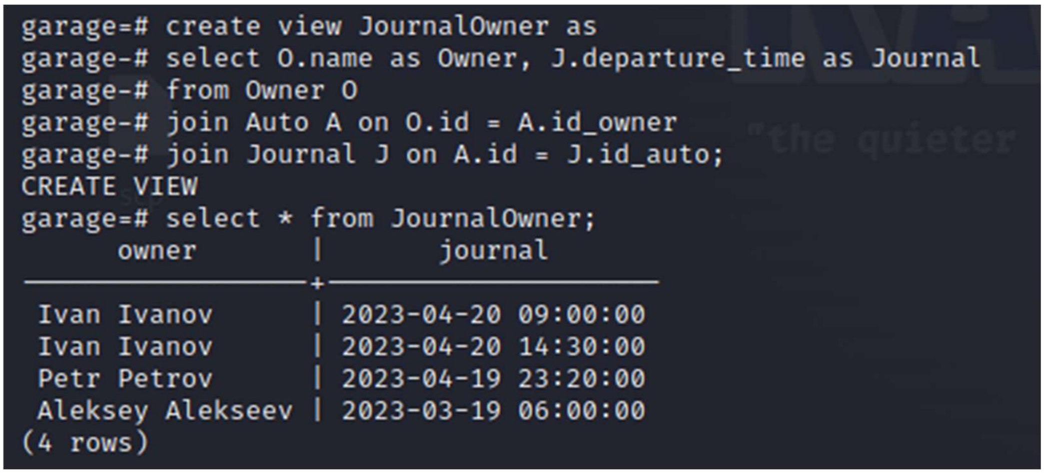
```
garage=# create view AutoOwner AS select id, id_owner, license_plate from Auto where id_owner = 1;
CREATE VIEW
garage=# select * from AutoOwner
garage-# ;
 id | id_owner | license_plate
----+----------+---------------
  1 |        1 | O000OO
  2 |        1 | O001OO
(2 rows)
```

Использование представления для отображения вычисляемых столбцов



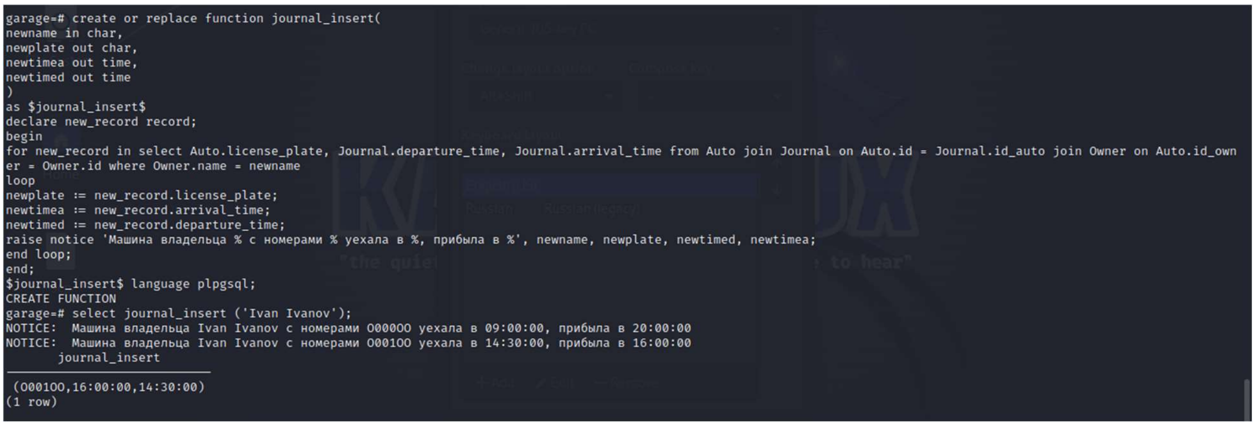
```
garage=# create view OwnerPhone AS select name, ('(' ||address|| ')') || phone_num AS Phone from Owner;
CREATE VIEW
garage=# select * from OwnerPhone;
       name       |                phone
------------------+-------------------------------------
 Petr Petrov      | (Gagarin Street, 5)8-800-555-35-36
 Aleksey Alekseev | (Pushkin Street, 22)8-800-555-35-37
 Ivan Ivanov      | (Lenin Street, 10)8-800-666-36-36
(3 rows)
```

Использование представления для скрытия сложного синтаксиса



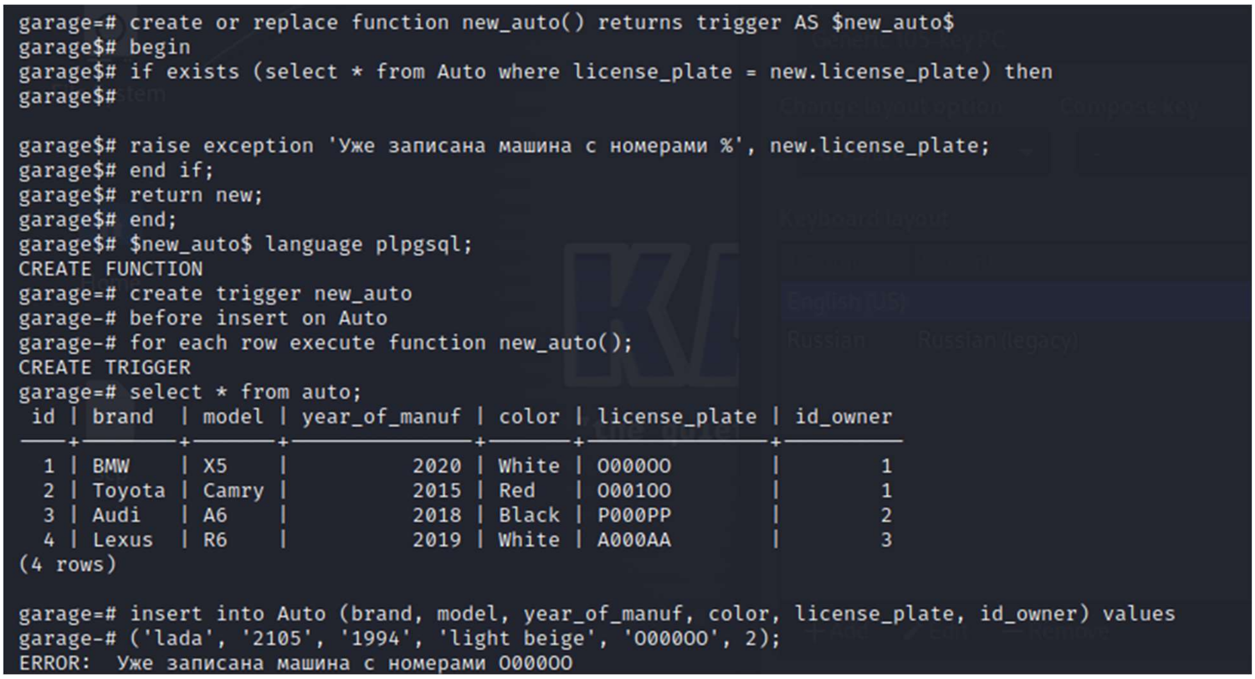
```
garage=# create view JournalOwner as
garage-# select O.name as Owner, J.departure_time as Journal
garage-# from Owner O
garage-# join Auto A on O.id = A.id_owner
garage-# join Journal J on A.id = J.id_auto;
CREATE VIEW
garage=# select * from JournalOwner;
      owner        |       journal
-------------------+---------------------
 Ivan Ivanov       | 2023-04-20 09:00:00
 Ivan Ivanov       | 2023-04-20 14:30:00
 Petr Petrov       | 2023-04-19 23:20:00
 Aleksey Alekseev  | 2023-03-19 06:00:00
(4 rows)
```

Хранимая процедура.



```
garage=# create or replace function journal_insert(
newname in char,
newplate out char,
newtimea out time,
newtimed out time
)
as $journal_insert$
declare new_record record;
begin
for new_record in select Auto.license_plate, Journal.departure_time, Journal.arrival_time from Auto join Journal on Auto.id = Journal.id_auto join Owner on Auto.id_own
er = Owner.id where Owner.name = newname
loop
newplate := new_record.license_plate;
newtimea := new_record.arrival_time;
newtimed := new_record.departure_time;
raise notice 'Машина владельца % с номерами % уехала в %, прибыла в %', newname, newplate, newtimed, newtimea;
end loop;
end;
$journal_insert$ language plpgsql;
CREATE FUNCTION
garage=# select journal_insert ('Ivan Ivanov');
NOTICE:  Машина владельца Ivan Ivanov с номерами O000OO уехала в 09:00:00, прибыла в 20:00:00
NOTICE:  Машина владельца Ivan Ivanov с номерами O001OO уехала в 14:30:00, прибыла в 16:00:00
       journal_insert
----------------------------
 (O001OO,16:00:00,14:30:00)
(1 row)
```

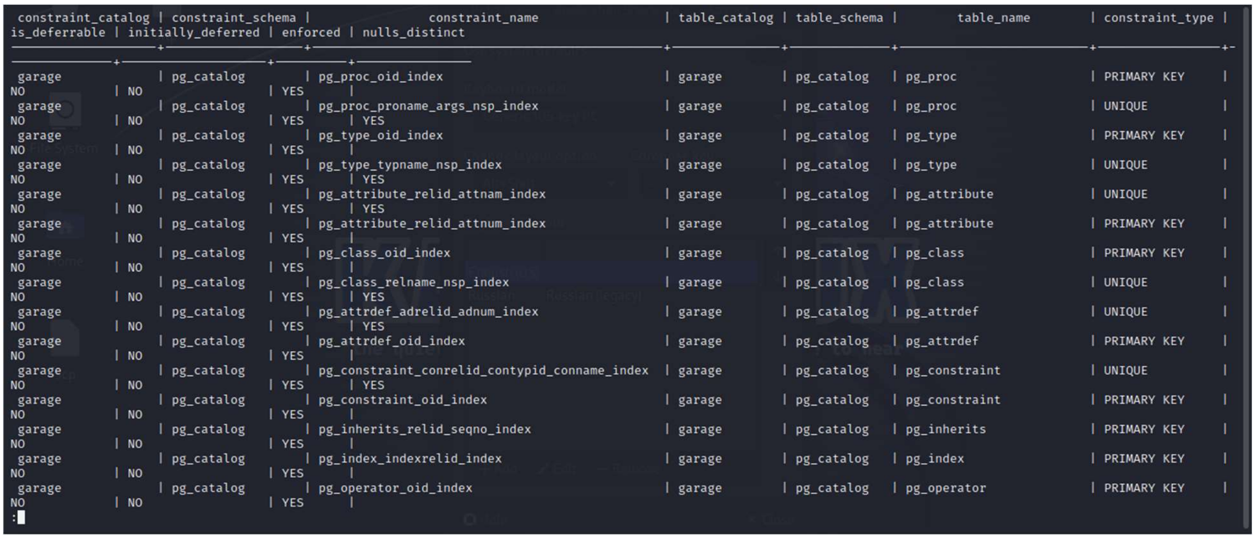
Использование триггеров для проверки допустимости вводимых данных



```
garage=# create or replace function new_auto() returns trigger AS $new_auto$
garage$# begin
garage$# if exists (select * from Auto where license_plate = new.license_plate) then
garage$#

garage$# raise exception 'Уже записана машина с номерами %', new.license_plate;
garage$# end if;
garage$# return new;
garage$# end;
garage$# $new_auto$ language plpgsql;
CREATE FUNCTION
garage=# create trigger new_auto
garage-# before insert on Auto
garage-# for each row execute function new_auto();
CREATE TRIGGER
garage=# select * from auto;
 id | brand  | model | year_of_manuf | color | license_plate | id_owner
----+--------+-------+---------------+-------+---------------+----------
  1 | BMW    | X5    |          2020 | White | O000OO        |        1
  2 | Toyota | Camry |          2015 | Red   | O001OO        |        1
  3 | Audi   | A6    |          2018 | Black | P000PP        |        2
  4 | Lexus  | R6    |          2019 | White | A000AA        |        3
(4 rows)

garage=# insert into Auto (brand, model, year_of_manuf, color, license_plate, id_owner) values
garage-# ('lada', '2105', '1994', 'light beige', 'O000OO', 2);
ERROR:  Уже записана машина с номерами O000OO
```

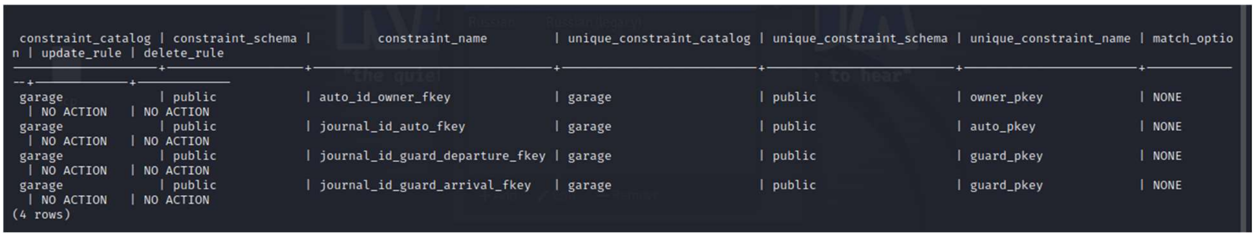
Словарь метаданных.

Получим список ограничений.



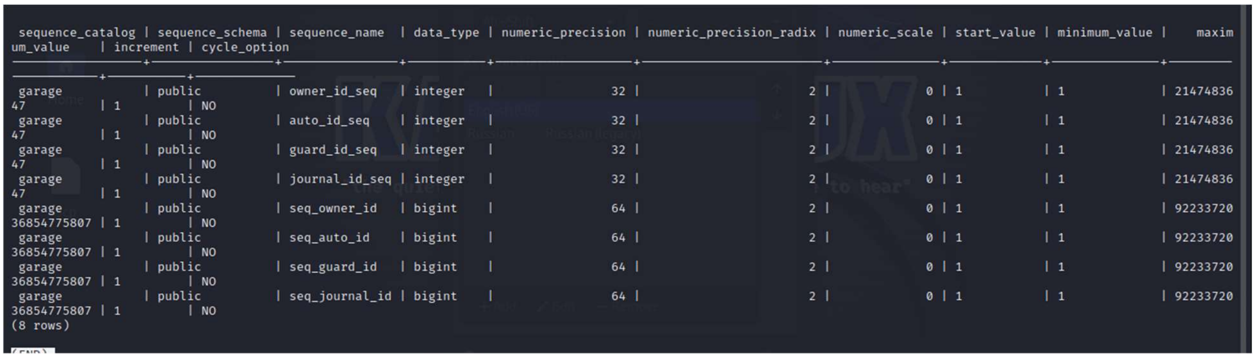
```
 constraint_catalog | constraint_schema |               constraint_name                | table_catalog | table_schema |       table_name       | constraint_type |
is_deferrable | initially_deferred | enforced | nulls_distinct
--------------------+-------------------+----------------------------------------------+---------------+--------------+------------------------+-----------------+-
--------------+--------------------+----------+----------------
 garage             | pg_catalog        | pg_proc_oid_index                            | garage        | pg_catalog   | pg_proc                | PRIMARY KEY     |
NO            | NO                 | YES      |
 garage             | pg_catalog        | pg_proc_proname_args_nsp_index               | garage        | pg_catalog   | pg_proc                | UNIQUE          |
NO            | NO                 | YES      | YES
 garage             | pg_catalog        | pg_type_oid_index                            | garage        | pg_catalog   | pg_type                | PRIMARY KEY     |
NO            | NO                 | YES      |
 garage             | pg_catalog        | pg_type_typname_nsp_index                    | garage        | pg_catalog   | pg_type                | UNIQUE          |
NO            | NO                 | YES      | YES
 garage             | pg_catalog        | pg_attribute_relid_attnam_index              | garage        | pg_catalog   | pg_attribute           | UNIQUE          |
NO            | NO                 | YES      | YES
 garage             | pg_catalog        | pg_attribute_relid_attnum_index              | garage        | pg_catalog   | pg_attribute           | PRIMARY KEY     |
NO            | NO                 | YES      |
 garage             | pg_catalog        | pg_class_oid_index                           | garage        | pg_catalog   | pg_class               | PRIMARY KEY     |
NO            | NO                 | YES      |
 garage             | pg_catalog        | pg_class_relname_nsp_index                   | garage        | pg_catalog   | pg_class               | UNIQUE          |
NO            | NO                 | YES      | YES
 garage             | pg_catalog        | pg_attrdef_adrelid_adnum_index               | garage        | pg_catalog   | pg_attrdef             | UNIQUE          |
NO            | NO                 | YES      | YES
 garage             | pg_catalog        | pg_attrdef_oid_index                         | garage        | pg_catalog   | pg_attrdef             | PRIMARY KEY     |
NO            | NO                 | YES      |
 garage             | pg_catalog        | pg_constraint_conrelid_contypid_conname_index | garage       | pg_catalog   | pg_constraint          | UNIQUE          |
NO            | NO                 | YES      | YES
 garage             | pg_catalog        | pg_constraint_oid_index                      | garage        | pg_catalog   | pg_constraint          | PRIMARY KEY     |
NO            | NO                 | YES      |
 garage             | pg_catalog        | pg_inherits_relid_seqno_index                | garage        | pg_catalog   | pg_inherits            | PRIMARY KEY     |
NO            | NO                 | YES      |
 garage             | pg_catalog        | pg_index_indexrelid_index                    | garage        | pg_catalog   | pg_index               | PRIMARY KEY     |
NO            | NO                 | YES      |
 garage             | pg_catalog        | pg_operator_oid_index                        | garage        | pg_catalog   | pg_operator            | PRIMARY KEY     |
NO            | NO                 | YES      |
:
```

Получим список внешних ключей



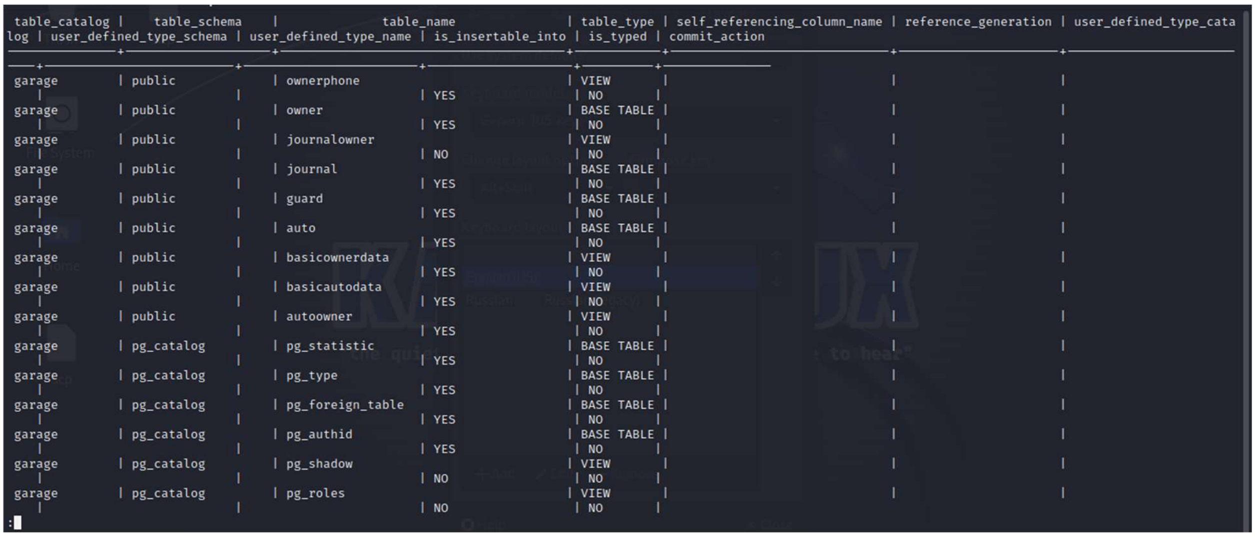
```
 constraint_catalog | constraint_schema |         constraint_name          | unique_constraint_catalog | unique_constraint_schema | unique_constraint_name | match_optio
n | update_rule | delete_rule
--------------------+-------------------+----------------------------------+---------------------------+--------------------------+------------------------+------------
--+-------------+-------------
 garage             | public            | auto_id_owner_fkey               | garage                    | public                   | owner_pkey             | NONE
  | NO ACTION   | NO ACTION
 garage             | public            | journal_id_auto_fkey             | garage                    | public                   | auto_pkey              | NONE
  | NO ACTION   | NO ACTION
 garage             | public            | journal_id_guard_departure_fkey | garage                    | public                   | guard_pkey             | NONE
  | NO ACTION   | NO ACTION
 garage             | public            | journal_id_guard_arrival_fkey   | garage                    | public                   | guard_pkey             | NONE
  | NO ACTION   | NO ACTION
(4 rows)
```

Получим список последовательностей.



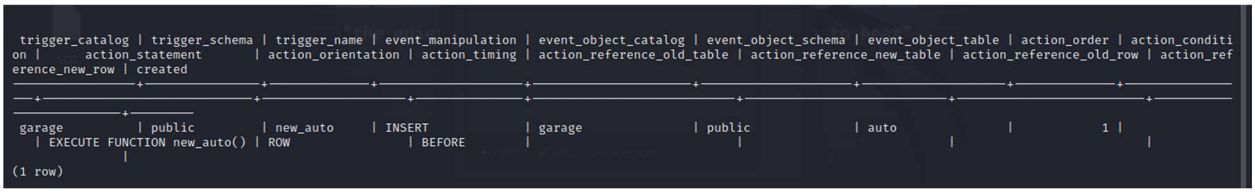
```
 sequence_catalog | sequence_schema | sequence_name  | data_type | numeric_precision | numeric_precision_radix | numeric_scale | start_value | minimum_value |     maxim
um_value     | increment | cycle_option
------------------+-----------------+----------------+-----------+-------------------+-------------------------+---------------+-------------+---------------+----------
-------------+-----------+--------------
 garage           | public          | owner_id_seq   | integer   |                32 |                       2 |             0 | 1           | 1             | 21474836
47           | 1         | NO
 garage           | public          | auto_id_seq    | integer   |                32 |                       2 |             0 | 1           | 1             | 21474836
47           | 1         | NO
 garage           | public          | guard_id_seq   | integer   |                32 |                       2 |             0 | 1           | 1             | 21474836
47           | 1         | NO
 garage           | public          | journal_id_seq | integer   |                32 |                       2 |             0 | 1           | 1             | 21474836
47           | 1         | NO
 garage           | public          | seq_owner_id   | bigint    |                64 |                       2 |             0 | 1           | 1             | 92233720
36854775807  | 1         | NO
 garage           | public          | seq_auto_id    | bigint    |                64 |                       2 |             0 | 1           | 1             | 92233720
36854775807  | 1         | NO
 garage           | public          | seq_guard_id   | bigint    |                64 |                       2 |             0 | 1           | 1             | 92233720
36854775807  | 1         | NO
 garage           | public          | seq_journal_id | bigint    |                64 |                       2 |             0 | 1           | 1             | 92233720
36854775807  | 1         | NO
(8 rows)

(END)
```

Получим список таблиц.



```
 table_catalog |     table_schema     |              table_name               | table_type | self_referencing_column_name | reference_generation | user_defined_type_cata
log | user_defined_type_schema | user_defined_type_name | is_insertable_into | is_typed | commit_action
---------------+----------------------+---------------------------------------+------------+------------------------------+----------------------+-----------------------
----+--------------------------+------------------------+--------------------+----------+---------------
 garage        | public               | ownerphone                            | VIEW       |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | public               | owner                                 | BASE TABLE |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | public               | journalowner                          | VIEW       |                              |                      |
    |                          |                        | NO                 | NO       |
 garage        | public               | journal                               | BASE TABLE |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | public               | guard                                 | BASE TABLE |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | public               | auto                                  | BASE TABLE |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | public               | basicownerdata                        | VIEW       |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | public               | basicautodata                         | VIEW       |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | public               | autoowner                             | VIEW       |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | pg_catalog           | pg_statistic                          | BASE TABLE |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | pg_catalog           | pg_type                               | BASE TABLE |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | pg_catalog           | pg_foreign_table                      | BASE TABLE |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | pg_catalog           | pg_authid                             | BASE TABLE |                              |                      |
    |                          |                        | YES                | NO       |
 garage        | pg_catalog           | pg_shadow                             | VIEW       |                              |                      |
    |                          |                        | NO                 | NO       |
 garage        | pg_catalog           | pg_roles                              | VIEW       |                              |                      |
    |                          |                        | NO                 | NO       |
:
```

Получим список триггеров



```
 trigger_catalog | trigger_schema | trigger_name | event_manipulation | event_object_catalog | event_object_schema | event_object_table | action_order | action_conditi
on |      action_statement       | action_orientation | action_timing | action_reference_old_table | action_reference_new_table | action_reference_old_row | action_ref
erence_new_row | created
-----------------+----------------+--------------+--------------------+----------------------+---------------------+--------------------+--------------+---------------
---+-----------------------------+--------------------+---------------+----------------------------+----------------------------+--------------------------+-----------
---------------+---------
 garage          | public         | new_auto     | INSERT             | garage               | public              | auto               |            1 |
   | EXECUTE FUNCTION new_auto() | ROW                | BEFORE        |                            |                            |                          |
               |
(1 row)
```