SQL-представления.

Использование представлений для скрытия столбцов

```
equipment=# create view BasicEquipmentData as select id, id_type, serial_number from equipment;
CREATE VIEW
equipment=# select * from BasicEquipmentData;
 id | id_type | serial_number
----+---------+---------------
  1 |       1 | SN101
  2 |       2 | SN201
  3 |       3 | SN301
(3 rows)
```

Следующий оператор определяет представление, содержащее информацию только того оборудования, которые находятся в департаменте 2.

```
equipment=# create view EquipmentDepart as select id, serial_number, id_department from equipment where id_department
 = 2;
CREATE VIEW
equipment=# select * from equipmentdepart;
 id | serial_number | id_department
----+---------------+---------------
  2 | SN201         |             2
(1 row)
```

Использование представления для отображения вычисляемых столбцов

```
equipment=# create view PersonsData as select name, ('(' ||email|| ')') || phone as Phone from Persons;
CREATE VIEW
equipment=# select * from personsdata
equipment-# ;
      name      |                Phone
----------------+-------------------------------------
 Ivanov Ivan    | (ivanovivan@google.com)89005004031
 Andreev Andrey | (andrey012@yandex.ru)89005004033
 Petrov Petr    | (petrovpetr@mail.ru)88006005052
(3 rows)
```

Использование представления для скрытия сложного синтаксиса

```
equipment=# create view PersonsEquip as
select P.name as Persons, T.name as Type
from Equipment E
join Persons P on P.id = E.id_person
join Type T on T.id = E.id_type;
CREATE VIEW
equipment=# select * from PersonsEquip;
    persons     |   type
----------------+----------
 Ivanov Ivan    | laptop
 Andreev Andrey | monitor
 Petrov Petr    | keyboard
(3 rows)
```

Хранимая процедура.

```
equipment=# create or replace function Journal_data(
newname in char,
newtype out char,
newtimei out date,
newtimer out date
)
as $journal_data$
declare new_record record;
begin
for new_record in select Type.name, Journal.date_of_issue, Journal.date_of_return from Equipment join Journal on Equi
pment.id = Journal.id_equipment join Type on Type.id = Equipment.id_type join Persons on Equipment.id_person = Person
s.id where Persons.name = newname
loop
newtype := new_record.name;
newtimei := new_record.date_of_issue;
newtimer := new_record.date_of_return;
raise notice '% взял %. Время выдачи - %, время возвращения - %', newname, newtype, newtimei, newtimer;
end loop;
end;
$journal_data$ language plpgsql;
CREATE FUNCTION
equipment=# select journal_data('Ivanov Ivan');
NOTICE:  Ivanov Ivan взял laptop. Время выдачи - 2023-03-03, время возвращения - <NULL>
     journal_data
---------------------
 (laptop,2023-03-03,)
(1 row)

equipment=#
```

Использование триггеров для проверки допустимости вводимых данных

```
equipment=# create or replace function new_equipment() returns trigger as $new_equipment$
equipment$# begin
equipment$# if exists (select * from Equipment where serial_number = new.serial_number) then
equipment$# raise exception 'Уже записано оборудование с серийным номером %', new.serial_number;
equipment$# end if;
equipment$# return new;
equipment$# end;
equipment$# $new_equipment$ language plpgsql;
CREATE FUNCTION
```

```
equipment=# create trigger new_equipment
before insert on Equipment
for each row execute function new_equipment();
CREATE TRIGGER
equipment=# select * from equipment;
 id | serial_number | date_of_purchase |  price  | id_type | id_department | id_person
----+---------------+------------------+---------+---------+---------------+-----------
  1 | SN101         | 2023-01-10       |    2500 |       1 |             1 |         1
  2 | SN201         | 2020-05-07       |    1000 |       2 |             2 |         3
  3 | SN301         | 2021-04-04       | 1999.99 |       3 |             3 |         2
(3 rows)
```

```
equipment=# insert into Equipment(serial_number, date_of_purchase, price, id_type, id_department, id_person) values
('SN101', '2020-12-12', 1000, 1, 1, 3);
ERROR:  Уже записано оборудование с серийным номером SN101
```

Словарь метаданных.

Получим список ограничений.

```
 constraint_catalog | constraint_schema |               constraint_name                | table_catalog | table_sche
ma |        table_name        | constraint_type | is_deferrable | initially_deferred | enforced | nulls_distinct
-------------------+------------------+---------------------------------------------+---------------+-----------
---+--------------------------+-----------------+---------------+--------------------+----------+---------------
 equipment         | pg_catalog       | pg_proc_oid_index                             | equipment     | pg_catalog
   | pg_proc                  | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_proc_proname_args_nsp_index                | equipment     | pg_catalog
   | pg_proc                  | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_type_oid_index                             | equipment     | pg_catalog
   | pg_type                  | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_type_typname_nsp_index                     | equipment     | pg_catalog
   | pg_type                  | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_attribute_relid_attnam_index               | equipment     | pg_catalog
   | pg_attribute             | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_attribute_relid_attnum_index               | equipment     | pg_catalog
   | pg_attribute             | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_class_oid_index                            | equipment     | pg_catalog
   | pg_class                 | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_class_relname_nsp_index                    | equipment     | pg_catalog
   | pg_class                 | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_attrdef_adrelid_adnum_index                | equipment     | pg_catalog
   | pg_attrdef               | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_attrdef_oid_index                          | equipment     | pg_catalog
   | pg_attrdef               | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_constraint_conrelid_contypid_conname_index | equipment     | pg_catalog
   | pg_constraint            | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_constraint_oid_index                       | equipment     | pg_catalog
   | pg_constraint            | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_inherits_relid_seqno_index                 | equipment     | pg_catalog
   | pg_inherits              | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_index_indexrelid_index                     | equipment     | pg_catalog
   | pg_index                 | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_operator_oid_index                         | equipment     | pg_catalog
   | pg_operator              | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_operator_oprname_l_r_n_index               | equipment     | pg_catalog
   | pg_operator              | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_opfamily_am_name_nsp_index                 | equipment     | pg_catalog
   | pg_opfamily              | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_opfamily_oid_index                         | equipment     | pg_catalog
   | pg_opfamily              | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_opclass_am_name_nsp_index                  | equipment     | pg_catalog
   | pg_opclass               | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_opclass_oid_index                          | equipment     | pg_catalog
   | pg_opclass               | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_am_name_index                              | equipment     | pg_catalog
   | pg_am                    | UNIQUE          | NO            | NO                 | YES      | YES
 equipment         | pg_catalog       | pg_am_oid_index                               | equipment     | pg_catalog
   | pg_am                    | PRIMARY KEY     | NO            | NO                 | YES      |
 equipment         | pg_catalog       | pg_amop_fam_strat_index                       | equipment     | pg_catalog
   | pg_amop                  | UNIQUE          | NO            | NO                 | YES      | YES
:
```

Получим список внешних ключей

```
 constraint_catalog | constraint_schema |       constraint_name        | unique_constraint_catalog | unique_constrain
t_schema | unique_constraint_name | match_option | update_rule | delete_rule
-------------------+-------------------+------------------------------+---------------------------+-----------------
---------+------------------------+--------------+-------------+-------------
 equipment          | public            | equipment_id_type_fkey       | equipment                 | public
         | type_pkey              | NONE         | NO ACTION   | NO ACTION
 equipment          | public            | equipment_id_department_fkey | equipment                 | public
         | departments_pkey       | NONE         | NO ACTION   | NO ACTION
 equipment          | public            | journal_id_person_fkey       | equipment                 | public
         | persons_pkey           | NONE         | NO ACTION   | NO ACTION
 equipment          | public            | equipment_id_person_fkey     | equipment                 | public
         | persons_pkey           | NONE         | NO ACTION   | NO ACTION
 equipment          | public            | journal_id_equipment_fkey    | equipment                 | public
         | equipment_pkey         | NONE         | NO ACTION   | NO ACTION
(5 rows)
```

Получим список последовательностей.

```
 sequence_catalog | sequence_schema |   sequence_name    | data_type | numeric_precision | numeric_precision_radix |
numeric_scale | start_value | minimum_value |    maximum_value    | increment | cycle_option
----------------+----------------+-------------------+-----------+-------------------+-------------------------+-
--------------+-------------+---------------+---------------------+-----------+--------------
 equipment      | public         | type_id_seq       | integer   |                32 |                       2 |
            0 | 1           | 1             |          2147483647 |         1 | NO
 equipment      | public         | departments_id_seq | integer   |                32 |                       2 |
            0 | 1           | 1             |          2147483647 |         1 | NO
 equipment      | public         | persons_id_seq    | integer   |                32 |                       2 |
            0 | 1           | 1             |          2147483647 |         1 | NO
 equipment      | public         | equipment_id_seq  | integer   |                32 |                       2 |
            0 | 1           | 1             |          2147483647 |         1 | NO
 equipment      | public         | journal_id_seq    | integer   |                32 |                       2 |
            0 | 1           | 1             |          2147483647 |         1 | NO
 equipment      | public         | seq_type_id       | bigint    |                64 |                       2 |
            0 | 1           | 1             | 9223372036854775807 |         1 | NO
 equipment      | public         | seq_departments_id | bigint    |                64 |                       2 |
            0 | 1           | 1             | 9223372036854775807 |         1 | NO
 equipment      | public         | seq_persons_id    | bigint    |                64 |                       2 |
            0 | 1           | 1             | 9223372036854775807 |         1 | NO
 equipment      | public         | seq_equipment_id  | bigint    |                64 |                       2 |
            0 | 1           | 1             | 9223372036854775807 |         1 | NO
 equipment      | public         | seq_journal_id    | bigint    |                64 |                       2 |
            0 | 1           | 1             | 9223372036854775807 |         1 | NO
(10 rows)

(END)
```

Получим список таблиц.

```
 table_catalog |    table_schema    |             table_name             | table_type | self_referencing_column_na
me | reference_generation | user_defined_type_catalog | user_defined_type_schema | user_defined_type_name | is_insert
able_into | is_typed | commit_action
---------------+--------------------+------------------------------------+------------+------------------------
---+----------------------+---------------------------+--------------------------+------------------------+----------
----------+----------+--------------
 equipment     | public             | type                               | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | public             | equipment                          | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | public             | departments                        | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | public             | persons                            | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | public             | journal                            | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | pg_catalog         | pg_statistic                       | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | pg_catalog         | pg_type                            | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | public             | basicequipmentdata                 | VIEW       |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | public             | equipmentdepart                    | VIEW       |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | public             | personsdata                        | VIEW       |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | public             | personsequip                       | VIEW       |
   |                      |                           |                          |                        | NO
         | NO       |
 equipment     | pg_catalog         | pg_foreign_table                   | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | pg_catalog         | pg_authid                          | BASE TABLE |
   |                      |                           |                          |                        | YES
         | NO       |
 equipment     | pg_catalog         | pg_shadow                          | VIEW       |
   |                      |                           |                          |                        | NO
         | NO       |
 equipment     | pg_catalog         | pg_roles                           | VIEW       |
   |                      |                           |                          |                        | NO
:
```

Получим список представлений

Получим список хранимых процедур.

```
 specific_catalog |  specific_schema  |                       specific_name                        | routine_catalog
|   routine_schema   |                    routine_name                    | routine_type | module_catalog | module_
schema | module_name | udt_catalog | udt_schema | udt_name |           data_type           | character_maximum_length
| character_octet_length | character_set_catalog | character_set_schema | character_set_name | collation_catalog | co
llation_schema | collation_name | numeric_precision | numeric_precision_radix | numeric_scale | datetime_precision |
interval_type | interval_precision | type_udt_catalog | type_udt_schema |        type_udt_name         | scope_catalo
g | scope_schema | scope_name | maximum_cardinality | dtd_identifier | routine_body |
                                                                                           routine_definition

   |        external_name         | external_language | parameter_style | is_deterministic | sql_data_access | is_n
ull_call | sql_path | schema_level_routine | max_dynamic_result_sets | is_user_defined_cast | is_implicitly_invocable
 | security_type | to_sql_specific_catalog | to_sql_specific_schema | to_sql_specific_name | as_locator | created | l
ast_altered | new_savepoint_level | is_udt_dependent | result_cast_from_data_type | result_cast_as_locator | result_c
ast_char_max_length | result_cast_char_octet_length | result_cast_char_set_catalog | result_cast_char_set_schema | re
sult_cast_char_set_name | result_cast_collation_catalog | result_cast_collation_schema | result_cast_collation_name |
 result_cast_numeric_precision | result_cast_numeric_precision_radix | result_cast_numeric_scale | result_cast_dateti
me_precision | result_cast_interval_type | result_cast_interval_precision | result_cast_type_udt_catalog | result_cas
t_type_udt_schema | result_cast_type_udt_name | result_cast_scope_catalog | result_cast_scope_schema | result_cast_sc
ope_name | result_cast_maximum_cardinality | result_cast_dtd_identifier
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---------+--------------------------------+---------------------------
 equipment        | pg_catalog        | boolin_1242                                                | equipment
| pg_catalog         | boolin                                             | FUNCTION     |                |
      |             |             |            |          | boolean                       |
|                        |                       |                      |                    |                   |
               |                |                   |                         |               |                    |
              |                    | equipment        | pg_catalog      | bool                         |
  |               |             |                      | 0                | EXTERNAL     | boolin


   |                              | INTERNAL          | GENERAL         | YES              | MODIFIES        | YES
         |          | YES                     |                       0 |                      |
 | INVOKER       |                          |                         |                       | NO         |         |
:
```

Получим список триггеров

```
 trigger_catalog | trigger_schema | trigger_name  | event_manipulation | event_object_catalog | event_object_schema |
 event_object_table | action_order | action_condition |         action_statement         | action_orientation | actio
n_timing | action_reference_old_table | action_reference_new_table | action_reference_old_row | action_reference_new_
row | created
-----------------+----------------+---------------+--------------------+----------------------+---------------------+
--------------------+--------------+------------------+----------------------------------+--------------------+------
---------+----------------------------+----------------------------+--------------------------+-----------------------
----+---------
 equipment       | public         | new_equipment | INSERT             | equipment            | public              |
 equipment          |            1 |                  | EXECUTE FUNCTION new_equipment() | ROW                | BEFOR
E        |                            |                            |                          |
    |
(1 row)
```