Отчет

по лабораторной работе №3.2 «Создание таблиц базы данных PostgreSQL. Заполнение таблиц рабочими данными»

по дисциплине **«Проектирование и реализация баз данных»**

Автор: Хурс П.И.

Факультет: ИКТ

Группа: K3240

Преподаватель: Говорова М.М.

ИТМО

Санкт-Петербург 2023

Оглавление

Цель работы

Овладеть практическими навыками создания таблиц базы данных PostgreSQL 1X, заполнения их рабочими данными, резервного копирования и восстановления БД.

Практическое задание

1. Создать базу данных с использованием pgAdmin 4 (согласно индивидуальному заданию).
2. Создать схему в составе базы данных.
3. Создать таблицы базы данных.
4. Установить ограничения на данные: Primary Key, Unique, Check, Foreign Key.
5. Заполнить таблицы БД рабочими данными.
6. Создать резервную копию БД.

   Указание:

   Создать две резервные копии:

   - с расширением CUSTOM для восстановления БД;

   - с расширением PLAIN для листинга (в отчете);

   - при создании резервных копий БД настроить параметры Dump options для Type of objects и Queries.

7. Восстановить БД.

Вариант 12. БД «Прокат автомобилей»

Описание предметной области:

Схема логической модели базы данных, сгенерированная в Generate ERD указана на рисунке 1.
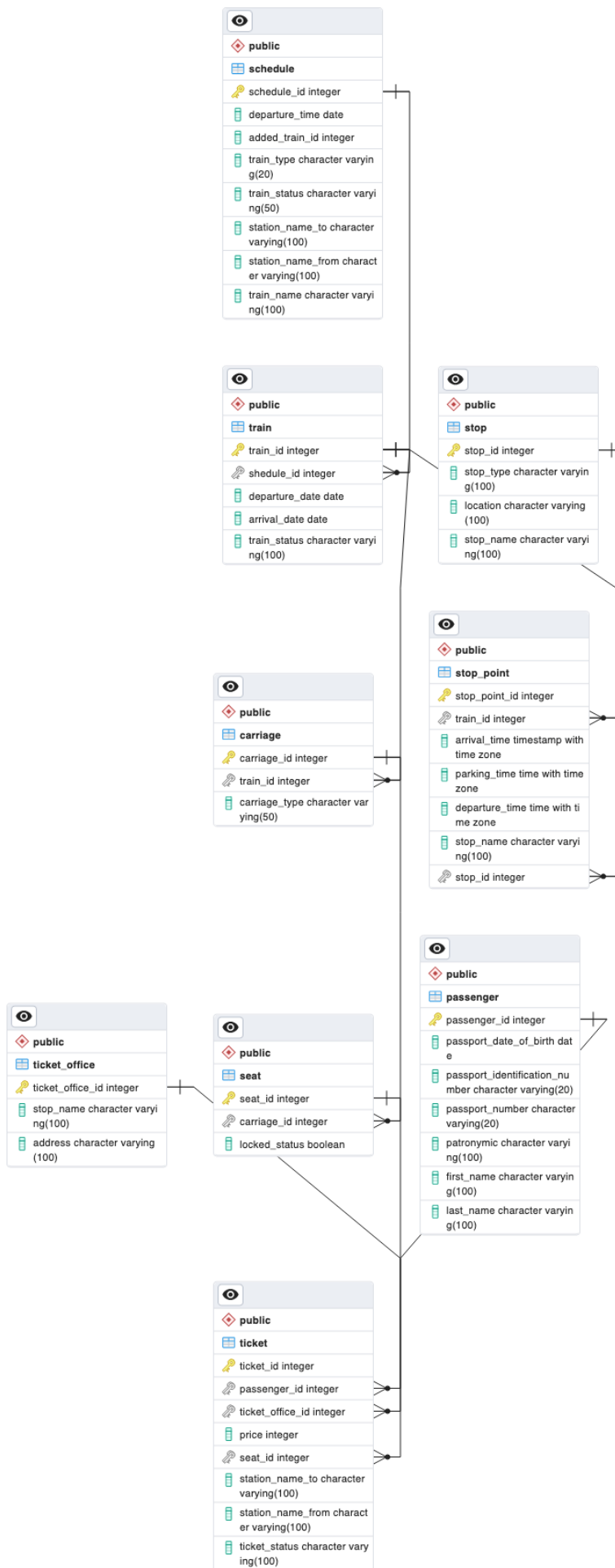
public

schedule

- 🔑 schedule_id integer
- departure_time date
- added_train_id integer
- train_type character varying(20)
- train_status character varying(50)
- station_name_to character varying(100)
- station_name_from character varying(100)
- train_name character varying(100)

public

train

- 🔑 train_id integer
- shedule_id integer
- departure_date date
- arrival_date date
- train_status character varying(100)

public

stop

- 🔑 stop_id integer
- stop_type character varying(100)
- location character varying(100)
- stop_name character varying(100)

public

stop_point

- 🔑 stop_point_id integer
- train_id integer
- arrival_time timestamp with time zone
- parking_time time with time zone
- departure_time time with time zone
- stop_name character varying(100)
- stop_id integer

public

carriage

- 🔑 carriage_id integer
- train_id integer
- carriage_type character varying(50)

public

passenger

- 🔑 passenger_id integer
- passport_date_of_birth date
- passport_identification_number character varying(20)
- passport_number character varying(20)
- patronymic character varying(100)
- first_name character varying(100)
- last_name character varying(100)

public

ticket_office

- 🔑 ticket_office_id integer
- stop_name character varying(100)
- address character varying(100)

public

seat

- 🔑 seat_id integer
- carriage_id integer
- locked_status boolean

public

ticket

- 🔑 ticket_id integer
- passenger_id integer
- ticket_office_id integer
- price integer
- seat_id integer
- station_name_to character varying(100)
- station_name_from character varying(100)
- ticket_status character varying(100)

4

Рисунок 1 – Схема логической модели базы данных.

Листинг дампа:

```sql
--

-- PostgreSQL database dump

--




-- Dumped from database version 16.0

-- Dumped by pg_dump version 16.0




-- Started on 2023-10-26 00:56:25 MSK




SET statement_timeout = 0;

SET lock_timeout = 0;

SET idle_in_transaction_session_timeout = 0;

SET client_encoding = 'UTF8';

SET standard_conforming_strings = on;

SELECT pg_catalog.set_config('search_path', '', false);

SET check_function_bodies = false;

SET xmloption = content;

SET client_min_messages = warning;

SET row_security = off;




--

-- TOC entry 3663 (class 1262 OID 16398)

-- Name: pashahurs; Type: DATABASE; Schema: -; Owner: postgres

--




CREATE DATABASE pashahurs WITH TEMPLATE = template0 ENCODING = 'UTF8' LOCALE_PROVIDER = libc LOCALE = 'C';
```

```sql
ALTER DATABASE pashahurs OWNER TO postgres;



\connect pashahurs



SET statement_timeout = 0;

SET lock_timeout = 0;

SET idle_in_transaction_session_timeout = 0;

SET client_encoding = 'UTF8';

SET standard_conforming_strings = on;

SELECT pg_catalog.set_config('search_path', '', false);

SET check_function_bodies = false;

SET xmloption = content;

SET client_min_messages = warning;

SET row_security = off;



SET default_tablespace = '';



SET default_table_access_method = heap;



--

-- TOC entry 221 (class 1259 OID 16464)

-- Name: carriage; Type: TABLE; Schema: public; Owner: postgres

--



CREATE TABLE public.carriage (

carriage_id integer NOT NULL,
```

```
    train_id integer NOT NULL,

    carriage_type character varying(50) NOT NULL

);



ALTER TABLE public.carriage OWNER TO postgres;



--

-- TOC entry 215 (class 1259 OID 16418)

-- Name: passenger; Type: TABLE; Schema: public; Owner: postgres

--



CREATE TABLE public.passenger (

passenger_id integer NOT NULL,

passport_date_of_birth date NOT NULL,

passport_identification_number character varying(20),

passport_number character varying(20),

patronymic character varying(100),

first_name character varying(100),

last_name character varying(100),

CONSTRAINT passenger_id CHECK ((passenger_id > 0))

);



ALTER TABLE public.passenger OWNER TO postgres;



--

-- TOC entry 220 (class 1259 OID 16456)

-- Name: schedule; Type: TABLE; Schema: public; Owner: postgres

--
```

```sql
CREATE TABLE public.schedule (

schedule_id integer NOT NULL,

departure_time date NOT NULL,

added_train_id integer,

train_type character varying(20) NOT NULL,

train_status character varying(50) NOT NULL,

station_name_to character varying(100) NOT NULL,

station_name_from character varying(100) NOT NULL,

train_name character varying(100) NOT NULL,

CONSTRAINT schedule_id CHECK ((schedule_id > 0))

);


ALTER TABLE public.schedule OWNER TO postgres;


--

-- TOC entry 218 (class 1259 OID 16442)

-- Name: seat; Type: TABLE; Schema: public; Owner: postgres

--


CREATE TABLE public.seat (

seat_id integer NOT NULL,

carriage_id integer NOT NULL,

locked_status boolean NOT NULL,

CONSTRAINT seat_id CHECK ((seat_id > 0))

);


ALTER TABLE public.seat OWNER TO postgres;
```

```sql
CREATE TABLE public.stop (

stop_id integer NOT NULL,

stop_type character varying(100) NOT NULL,

location character varying(100) NOT NULL,

stop_name character varying(100) NOT NULL

);


ALTER TABLE public.stop OWNER TO postgres;
```

```sql
CREATE TABLE public.stop_point (

stop_point_id integer NOT NULL,

train_id integer NOT NULL,

arrival_time timestamp with time zone NOT NULL,

parking_time time with time zone NOT NULL,

departure_time time with time zone NOT NULL,

stop_name character varying(100),

stop_id integer NOT NULL
```

```sql
);



ALTER TABLE public.stop_point OWNER TO postgres;



--

-- TOC entry 217 (class 1259 OID 16434)

-- Name: ticket; Type: TABLE; Schema: public; Owner: postgres

--



CREATE TABLE public.ticket (

ticket_id integer NOT NULL,

passenger_id integer NOT NULL,

ticket_office_id integer NOT NULL,

price integer NOT NULL,

seat_id integer NOT NULL,

station_name_to character varying(100) NOT NULL,

station_name_from character varying(100) NOT NULL,

ticket_status character varying(100) NOT NULL,

CONSTRAINT price CHECK ((price > 0))

);



ALTER TABLE public.ticket OWNER TO postgres;



--

-- TOC entry 216 (class 1259 OID 16426)

-- Name: ticket_office; Type: TABLE; Schema: public; Owner: postgres

--
```

```sql
CREATE TABLE public.ticket_office (

ticket_office_id integer NOT NULL,

stop_name character varying(100),

address character varying(100),

CONSTRAINT ticket_office_id CHECK ((ticket_office_id > 0))

);
```

```sql
ALTER TABLE public.ticket_office OWNER TO postgres;
```

--

-- TOC entry 219 (class 1259 OID 16448)

-- Name: train; Type: TABLE; Schema: public; Owner: postgres

--

```sql
CREATE TABLE public.train (

train_id integer NOT NULL,

shedule_id integer NOT NULL,

departure_date date NOT NULL,

arrival_date date NOT NULL,

train_status character varying(100),

CONSTRAINT train_id CHECK ((train_id > 0))

);
```

```sql
ALTER TABLE public.train OWNER TO postgres;
```

--

-- TOC entry 3655 (class 0 OID 16464)

-- Dependencies: 221

-- Data for Name: carriage; Type: TABLE DATA; Schema: public; Owner: postgres

--

```sql
INSERT INTO public.carriage VALUES (1, 1, 'Economy') ON CONFLICT DO NOTHING;

INSERT INTO public.carriage VALUES (2, 1, 'Business') ON CONFLICT DO NOTHING;

INSERT INTO public.carriage VALUES (3, 2, 'Economy') ON CONFLICT DO NOTHING;
```

--

-- TOC entry 3649 (class 0 OID 16418)

-- Dependencies: 215

-- Data for Name: passenger; Type: TABLE DATA; Schema: public; Owner: postgres

--

```sql
INSERT INTO public.passenger VALUES (1, '1990-01-01', 'ID123456', 'P123456', 'Ivanovich', 'Ivan', 'Ivanov') ON CONFLICT DO NOTHING;

INSERT INTO public.passenger VALUES (2, '1985-05-05', 'ID654321', 'P654321', 'Petrovich', 'Petr', 'Petrov') ON CONFLICT DO NOTHING;
```

--

-- TOC entry 3654 (class 0 OID 16456)

-- Dependencies: 220

-- Data for Name: schedule; Type: TABLE DATA; Schema: public; Owner: postgres

--

```sql
INSERT INTO public.schedule VALUES (1, '2023-11-01', NULL, 'Express', 'On Time', 'StationB', 'StationA', 'TrainX') ON CONFLICT DO NOTHING;
```

```sql
INSERT INTO public.schedule VALUES (2, '2023-11-02', NULL, 'Normal', 'On Time', 'StationC', 'StationA', 'TrainY') ON CONFLICT DO NOTHING;
```

--

-- TOC entry 3652 (class 0 OID 16442)

-- Dependencies: 218

-- Data for Name: seat; Type: TABLE DATA; Schema: public; Owner: postgres

--

```sql
INSERT INTO public.seat VALUES (1, 1, false) ON CONFLICT DO NOTHING;

INSERT INTO public.seat VALUES (2, 1, true) ON CONFLICT DO NOTHING;

INSERT INTO public.seat VALUES (3, 2, false) ON CONFLICT DO NOTHING;

INSERT INTO public.seat VALUES (4, 3, false) ON CONFLICT DO NOTHING;
```

--

-- TOC entry 3656 (class 0 OID 16474)

-- Dependencies: 222

-- Data for Name: stop; Type: TABLE DATA; Schema: public; Owner: postgres

--

```sql
INSERT INTO public.stop VALUES (1, 'Major', 'CityA', 'StopA') ON CONFLICT DO NOTHING;

INSERT INTO public.stop VALUES (2, 'Minor', 'CityB', 'StopB') ON CONFLICT DO NOTHING;
```

--

-- TOC entry 3657 (class 0 OID 16481)

-- Dependencies: 223

-- Data for Name: stop_point; Type: TABLE DATA; Schema: public; Owner: postgres

```
--

INSERT INTO public.stop_point VALUES (1, 1, '2023-11-01 08:00:00+03', '00:30:00+03', '08:30:00+03', 'StopA', 1) ON CONFLICT DO NOTHING;

INSERT INTO public.stop_point VALUES (2, 1, '2023-11-01 10:00:00+03', '00:20:00+03', '10:20:00+03', 'StopB', 2) ON CONFLICT DO NOTHING;


--

-- TOC entry 3651 (class 0 OID 16434)

-- Dependencies: 217

-- Data for Name: ticket; Type: TABLE DATA; Schema: public; Owner: postgres

--


INSERT INTO public.ticket VALUES (1, 1, 1, 100, 1, 'StationB', 'StationA', 'Booked') ON CONFLICT DO NOTHING;

INSERT INTO public.ticket VALUES (2, 2, 1, 150, 3, 'StationC', 'StationA', 'Booked') ON CONFLICT DO NOTHING;


--

-- TOC entry 3650 (class 0 OID 16426)

-- Dependencies: 216

-- Data for Name: ticket_office; Type: TABLE DATA; Schema: public; Owner: postgres

--


INSERT INTO public.ticket_office VALUES (1, 'StopA', 'StreetA, CityA') ON CONFLICT DO NOTHING;

INSERT INTO public.ticket_office VALUES (2, 'StopB', 'StreetB, CityB') ON CONFLICT DO NOTHING;


--

-- TOC entry 3653 (class 0 OID 16448)
```

-- Dependencies: 219

-- Data for Name: train; Type: TABLE DATA; Schema: public; Owner: postgres

--

INSERT INTO public.train VALUES (1, 1, '2023-11-01', '2023-11-01', 'On Time') ON CONFLICT DO NOTHING;

INSERT INTO public.train VALUES (2, 2, '2023-11-02', '2023-11-02', 'On Time') ON CONFLICT DO NOTHING;

--

-- TOC entry 3493 (class 2606 OID 16470)

-- Name: carriage carriage_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres

--

ALTER TABLE ONLY public.carriage

ADD CONSTRAINT carriage_pkey PRIMARY KEY (carriage_id);

--

-- TOC entry 3481 (class 2606 OID 16425)

-- Name: passenger passenger_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres

--

ALTER TABLE ONLY public.passenger

ADD CONSTRAINT passenger_pkey PRIMARY KEY (passenger_id);

--

-- TOC entry 3491 (class 2606 OID 16463)

-- Name: schedule schedule_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres

```sql
--

ALTER TABLE ONLY public.schedule

ADD CONSTRAINT schedule_pkey PRIMARY KEY (schedule_id);


--

-- TOC entry 3487 (class 2606 OID 16447)

-- Name: seat seat_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres

--


ALTER TABLE ONLY public.seat

ADD CONSTRAINT seat_pkey PRIMARY KEY (seat_id);


--

-- TOC entry 3495 (class 2606 OID 16480)

-- Name: stop stop_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres

--


ALTER TABLE ONLY public.stop

ADD CONSTRAINT stop_pkey PRIMARY KEY (stop_id);


--

-- TOC entry 3497 (class 2606 OID 16487)

-- Name: stop_point stop_point_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres

--
```

```sql
ALTER TABLE ONLY public.stop_point
ADD CONSTRAINT stop_point_pkey PRIMARY KEY (stop_point_id);


--
-- TOC entry 3483 (class 2606 OID 16433)
-- Name: ticket_office ticket_office_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres
--


ALTER TABLE ONLY public.ticket_office
ADD CONSTRAINT ticket_office_pkey PRIMARY KEY (ticket_office_id);



--
-- TOC entry 3485 (class 2606 OID 16441)
-- Name: ticket ticket_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres
--


ALTER TABLE ONLY public.ticket
ADD CONSTRAINT ticket_pkey PRIMARY KEY (ticket_id);



--
-- TOC entry 3489 (class 2606 OID 16455)
-- Name: train train_pkey; Type: CONSTRAINT; Schema: public; Owner: postgres
--


ALTER TABLE ONLY public.train
ADD CONSTRAINT train_pkey PRIMARY KEY (train_id);
```

--

-- TOC entry 3503 (class 2606 OID 16508)

-- Name: carriage carriage_train_id_fkey; Type: FK CONSTRAINT; Schema: public; Owner: postgres

--

ALTER TABLE ONLY public.carriage

ADD CONSTRAINT carriage_train_id_fkey FOREIGN KEY (train_id) REFERENCES public.train(train_id) NOT VALID;

--

-- TOC entry 3501 (class 2606 OID 16503)

-- Name: seat seat_carriage_id_fkey; Type: FK CONSTRAINT; Schema: public; Owner: postgres

--

ALTER TABLE ONLY public.seat

ADD CONSTRAINT seat_carriage_id_fkey FOREIGN KEY (carriage_id) REFERENCES public.carriage(carriage_id) NOT VALID;

--

-- TOC entry 3504 (class 2606 OID 16523)

-- Name: stop_point stop_point_stop_id_fkey; Type: FK CONSTRAINT; Schema: public; Owner: postgres

--

ALTER TABLE ONLY public.stop_point

ADD CONSTRAINT stop_point_stop_id_fkey FOREIGN KEY (stop_id) REFERENCES public.stop(stop_id) NOT VALID;

--

-- TOC entry 3505 (class 2606 OID 16518)

-- Name: stop_point stop_point_train_id_fkey; Type: FK CONSTRAINT; Schema: public; Owner: postgres

--

```sql
ALTER TABLE ONLY public.stop_point
ADD CONSTRAINT stop_point_train_id_fkey FOREIGN KEY (train_id) REFERENCES public.train(train_id) NOT VALID;
```

--

-- TOC entry 3498 (class 2606 OID 16488)

-- Name: ticket ticket_passenger_id_fkey; Type: FK CONSTRAINT; Schema: public; Owner: postgres

--

```sql
ALTER TABLE ONLY public.ticket
ADD CONSTRAINT ticket_passenger_id_fkey FOREIGN KEY (passenger_id) REFERENCES public.passenger(passenger_id) NOT VALID;
```

--

-- TOC entry 3499 (class 2606 OID 16498)

-- Name: ticket ticket_seat_id_fkey; Type: FK CONSTRAINT; Schema: public; Owner: postgres

--

```sql
ALTER TABLE ONLY public.ticket
ADD CONSTRAINT ticket_seat_id_fkey FOREIGN KEY (seat_id) REFERENCES public.seat(seat_id) NOT VALID;
```

--

-- TOC entry 3500 (class 2606 OID 16493)

-- Name: ticket ticket_ticket_office_id_fkey; Type: FK CONSTRAINT; Schema: public; Owner: postgres

--

ALTER TABLE ONLY public.ticket

ADD CONSTRAINT ticket_ticket_office_id_fkey FOREIGN KEY (ticket_office_id) REFERENCES public.ticket_office(ticket_office_id) NOT VALID;

--

-- TOC entry 3502 (class 2606 OID 16513)

-- Name: train train_shedule_id_fkey; Type: FK CONSTRAINT; Schema: public; Owner: postgres

--

ALTER TABLE ONLY public.train

ADD CONSTRAINT train_shedule_id_fkey FOREIGN KEY (shedule_id) REFERENCES public.schedule(schedule_id) NOT VALID;

-- Completed on 2023-10-26 00:56:25 MSK

--

-- PostgreSQL database dump complete

--

Вывод

В рамках лабораторного задания я изучил взаимодействие с базами данных в PostgreSQL используя инструмент pgAdmin 4. Я разработал схему базы данных, включая таблицы и их ограничения, заполнил их информацией, создал бэкапы и успешно провёл процедуру восстановления, подтвердив правильность выполненных действий.