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Федеральное государственное автономное образовательное
учреждение высшего образования
«НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ ИТМО»
Факультет инфокоммуникационных технологий

ОТЧЕТ
О ЛАБОРАТОРНОЙ РАБОТЕ №3

по теме: Создание таблиц базы данных в postgresql.
Заполнение таблиц рабочими данными.
по дисциплине: Проектирование и реализация баз данных

Специальность:
09.03.03 Мобильные и сетевые технологии

Проверил:
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Дата: «04» мая 2021г.
Оценка _____

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Санкт-Петербург 2021 г.

Цель работы:

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

Оборудование:

Компьютерный класс.

Программное обеспечение:

СУБД PostgreSQL 1X, pgAdmin 4.

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.

Индивидуальное задание:

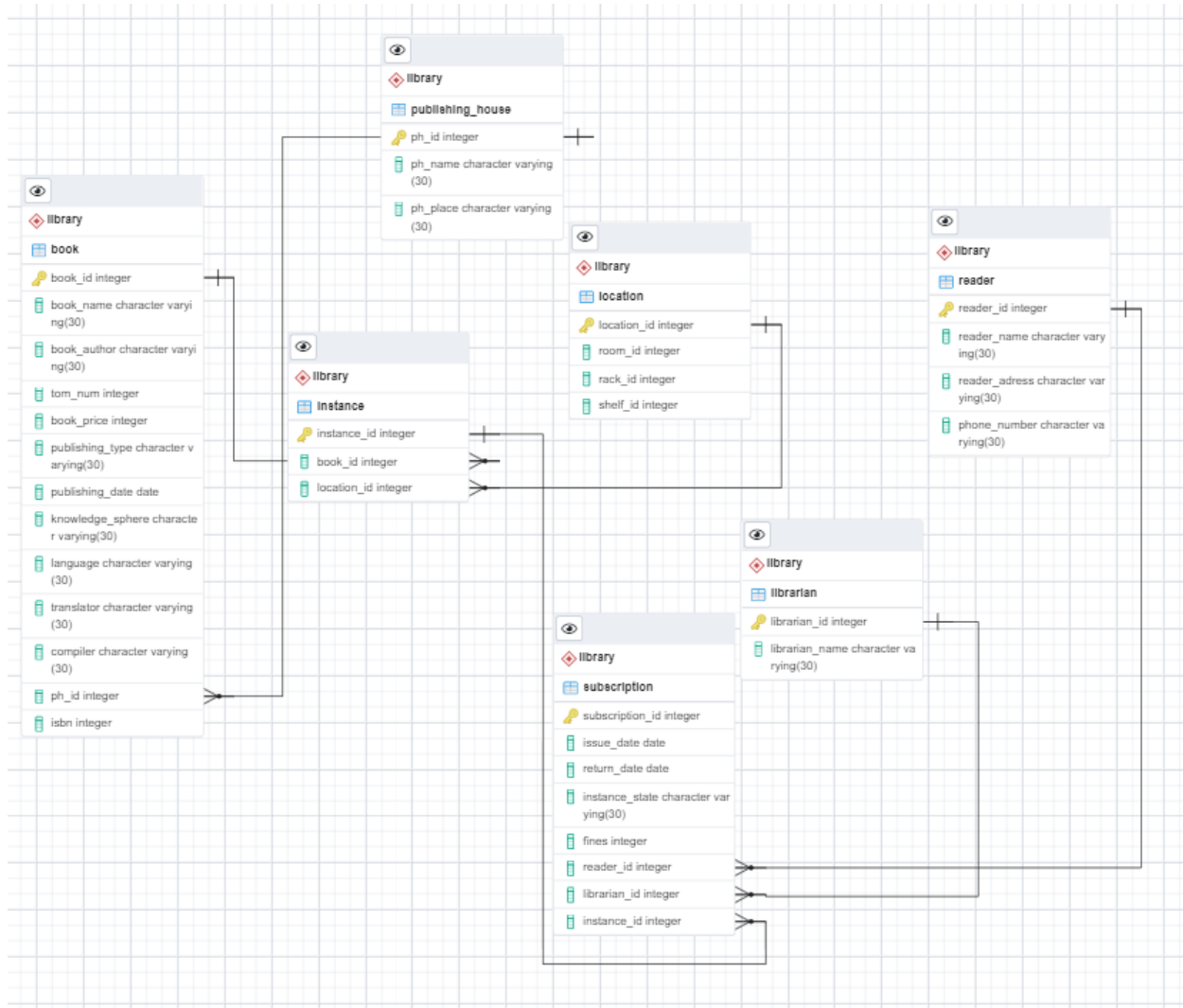
Вариант №3 “Библиотека”

Выполнение

1. Название БД

“library”

2. Схема инфологической модели данных БД



3. Plain dump

--

-- PostgreSQL database dump

--

-- Dumped from database version 11.11

-- Dumped by pg_dump version 11.11

-- Started on 2021-05-04 16:44:05

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 2889 (class 1262 OID 16397)

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

--

CREATE DATABASE library WITH TEMPLATE = template0 ENCODING =
'UTF8' LC_COLLATE = 'Russian_Russia.1251' LC_CTYPE =
'Russian_Russia.1251';

ALTER DATABASE library OWNER TO postgres;

\connect library

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 7 (class 2615 OID 16398)
-- Name: library; Type: SCHEMA; Schema: -; Owner: postgres
--

CREATE SCHEMA library;


ALTER SCHEMA library OWNER TO postgres;


SET default_tablespace = '';

SET default_with_oids = false;

--
-- TOC entry 202 (class 1259 OID 16455)
-- Name: book; Type: TABLE; Schema: library; Owner: postgres
--
```

```

CREATE TABLE library.book (
    book_id integer NOT NULL,
    book_name character varying(30) NOT NULL,
    book_author character varying(30) NOT NULL,
    tom_num integer,
    book_price integer NOT NULL,
    publishing_type character varying(30),
    publishing_date date NOT NULL,
    knowledge_sphere character varying(30),
    language character varying(30),
    translator character varying(30),
    compiler character varying(30),
    ph_id integer NOT NULL,
    isbn integer,
    CONSTRAINT r_list CHECK (((knowledge_sphere)::text = ANY
(ARRAY[('Общее образование'::character varying)::text, ('Технические
науки'::character varying)::text, ('Гуманитарные науки'::character
varying)::text, ('Социально-экономические науки'::character varying)::text,
('IT'::character varying)::text])))
);

```

```

ALTER TABLE library.book OWNER TO postgres;

```

```

--
-- TOC entry 199 (class 1259 OID 16421)
-- Name: instance; Type: TABLE; Schema: library; Owner: postgres
--

```

```

CREATE TABLE library.instance (

```

```
instance_id integer NOT NULL,  
book_id integer NOT NULL,  
location_id integer NOT NULL  
);
```

```
ALTER TABLE library.instance OWNER TO postgres;
```

```
--  
-- TOC entry 197 (class 1259 OID 16408)  
-- Name: librarian; Type: TABLE; Schema: library; Owner: postgres  
--
```

```
CREATE TABLE library.librarian (  
    librarian_id integer NOT NULL,  
    librarian_name character varying(30) NOT NULL  
);
```

```
ALTER TABLE library.librarian OWNER TO postgres;
```

```
--  
-- TOC entry 198 (class 1259 OID 16416)  
-- Name: location; Type: TABLE; Schema: library; Owner: postgres  
--
```

```
CREATE TABLE library.location (  
    location_id integer NOT NULL,  
    room_id integer NOT NULL,
```

```
    rack_id integer NOT NULL,  
    shelf_id integer NOT NULL  
);
```

```
ALTER TABLE library.location OWNER TO postgres;
```

```
--  
-- TOC entry 201 (class 1259 OID 16442)  
-- Name: publishing_house; Type: TABLE; Schema: library; Owner:  
postgres  
--
```

```
CREATE TABLE library.publishing_house (  
    ph_id integer NOT NULL,  
    ph_name character varying(30) NOT NULL,  
    ph_place character varying(30) NOT NULL  
);
```

```
ALTER TABLE library.publishing_house OWNER TO postgres;
```

```
--  
-- TOC entry 200 (class 1259 OID 16426)  
-- Name: reader; Type: TABLE; Schema: library; Owner: postgres  
--
```

```
CREATE TABLE library.reader (  
    reader_id integer NOT NULL,
```



```
    reader_name character varying(30) NOT NULL,  
    reader_adress character varying(30) NOT NULL,  
    phone_number character varying(30) NOT NULL  
);
```

```
ALTER TABLE library.reader OWNER TO postgres;
```

```
--  
-- TOC entry 203 (class 1259 OID 16533)  
-- Name: subscription; Type: TABLE; Schema: library; Owner: postgres  
--
```

```
CREATE TABLE library.subscription (  
    subscription_id integer NOT NULL,  
    issue_date date NOT NULL,  
    return_date date NOT NULL,  
    instance_state character varying(30) NOT NULL,  
    fines integer,  
    reader_id integer NOT NULL,  
    librarian_id integer NOT NULL,  
    instance_id integer NOT NULL,  
    CONSTRAINT sub_5 CHECK ((issue_date > '1790-01-01'::date)),  
    CONSTRAINT sub_6 CHECK ((return_date > '1790-01-01'::date)),  
    CONSTRAINT sub_7 CHECK ((return_date > issue_date)),  
    CONSTRAINT sub_8 CHECK (((return_date - issue_date) < 10))  
);
```

```
ALTER TABLE library.subscription OWNER TO postgres;
```

```
--
```

```
-- TOC entry 2882 (class 0 OID 16455)
```

```
-- Dependencies: 202
```

```
-- Data for Name: book; Type: TABLE DATA; Schema: library; Owner:  
postgres
```

```
--
```

```
INSERT INTO library.book (book_id, book_name, book_author, tom_num,  
book_price, publishing_type, publishing_date, knowledge_sphere,  
language, translator, compiler, ph_id, isbn) VALUES (1, 'Гамлет', 'Уильям  
Шекспир', NULL, 500, NULL, '1978-01-28', NULL, NULL, NULL, NULL, 3,  
NULL);
```

```
--
```

```
-- TOC entry 2879 (class 0 OID 16421)
```

```
-- Dependencies: 199
```

```
-- Data for Name: instance; Type: TABLE DATA; Schema: library; Owner:  
postgres
```

```
--
```

```
INSERT INTO library.instance (instance_id, book_id, location_id) VALUES  
(1, 1, 1);
```

```
INSERT INTO library.instance (instance_id, book_id, location_id) VALUES  
(2, 1, 1);
```

```
INSERT INTO library.instance (instance_id, book_id, location_id) VALUES  
(3, 1, 3);
```

```
INSERT INTO library.instance (instance_id, book_id, location_id) VALUES  
(4, 1, 2);
```

--

-- TOC entry 2877 (class 0 OID 16408)

-- Dependencies: 197

-- Data for Name: librarian; Type: TABLE DATA; Schema: library; Owner: postgres

--

INSERT INTO library.librarian (librarian_id, librarian_name) VALUES (1, 'Петров В.А.');

INSERT INTO library.librarian (librarian_id, librarian_name) VALUES (2, 'Васильев А.А.');

INSERT INTO library.librarian (librarian_id, librarian_name) VALUES (3, 'Мышкин К.К.');

INSERT INTO library.librarian (librarian_id, librarian_name) VALUES (4, 'Кошкин М.М.');

--

-- TOC entry 2878 (class 0 OID 16416)

-- Dependencies: 198

-- Data for Name: location; Type: TABLE DATA; Schema: library; Owner: postgres

--

INSERT INTO library.location (location_id, room_id, rack_id, shelf_id) VALUES (1, 6, 14, 3);

INSERT INTO library.location (location_id, room_id, rack_id, shelf_id) VALUES (2, 6, 14, 4);

INSERT INTO library.location (location_id, room_id, rack_id, shelf_id) VALUES (3, 6, 14, 5);

--

-- TOC entry 2881 (class 0 OID 16442)

-- Dependencies: 201

-- Data for Name: publishing_house; Type: TABLE DATA; Schema: library;
Owner: postgres

--

```
INSERT INTO library.publishing_house (ph_id, ph_name, ph_place)
VALUES (1, 'БХВ', 'Санкт-Петербург');
```

```
INSERT INTO library.publishing_house (ph_id, ph_name, ph_place)
VALUES (2, 'Питер', 'Санкт-Петербург');
```

```
INSERT INTO library.publishing_house (ph_id, ph_name, ph_place)
VALUES (3, 'АСТ', 'Москва');
```

--

-- TOC entry 2880 (class 0 OID 16426)

-- Dependencies: 200

-- Data for Name: reader; Type: TABLE DATA; Schema: library; Owner:
postgres

--

```
INSERT INTO library.reader (reader_id, reader_name, reader_adress,
phone_number) VALUES (1, 'Усатов К.А.', 'Спб, Бесстужевская д. 7',
'+79218888888');
```

```
INSERT INTO library.reader (reader_id, reader_name, reader_adress,
phone_number) VALUES (2, 'Пышкин У.Е.', 'Спб, Невский проспект д.
14', '+79215555555');
```

--

-- TOC entry 2883 (class 0 OID 16533)

-- Dependencies: 203

-- Data for Name: subscription; Type: TABLE DATA; Schema: library;
Owner: postgres

--

```
INSERT INTO library.subscription (subscription_id, issue_date,  
return_date, instance_state, fines, reader_id, librarian_id, instance_id)  
VALUES (1, '2012-05-21', '2012-05-28', 'В идеальном состоянии', NULL,  
1, 1, 1);
```

```
INSERT INTO library.subscription (subscription_id, issue_date,  
return_date, instance_state, fines, reader_id, librarian_id, instance_id)  
VALUES (2, '2012-05-21', '2012-05-29', 'Явно использовалась собакой',  
100, 1, 1, 2);
```

```
INSERT INTO library.subscription (subscription_id, issue_date,  
return_date, instance_state, fines, reader_id, librarian_id, instance_id)  
VALUES (3, '2012-05-30', '2012-06-05', 'В состоянии лучше прежнего',  
NULL, 2, 1, 1);
```

--

-- TOC entry 2745 (class 2606 OID 16463)

-- Name: book book_pkey; Type: CONSTRAINT; Schema: library; Owner:
postgres

--

```
ALTER TABLE ONLY library.book
```

```
ADD CONSTRAINT book_pkey PRIMARY KEY (book_id);
```

--

-- TOC entry 2739 (class 2606 OID 16425)

-- Name: instance example_pkey; Type: CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE ONLY library.instance

ADD CONSTRAINT example_pkey PRIMARY KEY (instance_id);

--

-- TOC entry 2717 (class 2606 OID 16499)

-- Name: instance inst_1; Type: CHECK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE library.instance

ADD CONSTRAINT inst_1 CHECK ((instance_id > 0)) NOT VALID;

--

-- TOC entry 2718 (class 2606 OID 16500)

-- Name: instance inst_2; Type: CHECK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE library.instance

ADD CONSTRAINT inst_2 CHECK ((book_id > 0)) NOT VALID;

--

-- TOC entry 2719 (class 2606 OID 16501)

-- Name: instance inst_3; Type: CHECK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE library.instance

ADD CONSTRAINT inst_3 CHECK ((location_id > 0)) NOT VALID;

--

-- TOC entry 2713 (class 2606 OID 16482)

-- Name: location l_1; Type: CHECK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE library.location

ADD CONSTRAINT l_1 CHECK ((location_id > 0)) NOT VALID;

--

-- TOC entry 2714 (class 2606 OID 16483)

-- Name: location l_2; Type: CHECK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE library.location

ADD CONSTRAINT l_2 CHECK ((room_id > 0)) NOT VALID;

--

-- TOC entry 2715 (class 2606 OID 16484)

-- Name: location l_3; Type: CHECK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE library.location

ADD CONSTRAINT l_3 CHECK ((rack_id > 0)) NOT VALID;

--

-- TOC entry 2716 (class 2606 OID 16485)

-- Name: location l_4; Type: CHECK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE library.location

ADD CONSTRAINT l_4 CHECK ((shelf_id > 0)) NOT VALID;

--

-- TOC entry 2712 (class 2606 OID 16487)

-- Name: librarian lib_1; Type: CHECK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE library.librarian

ADD CONSTRAINT lib_1 CHECK ((librarian_id > 0)) NOT VALID;

--

-- TOC entry 2735 (class 2606 OID 16415)

-- Name: librarian librarian_pkey; Type: CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE ONLY library.librarian

ADD CONSTRAINT librarian_pkey PRIMARY KEY (librarian_id);

--

-- TOC entry 2737 (class 2606 OID 16420)

-- Name: location location_pkey; Type: CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE ONLY library.location

ADD CONSTRAINT location_pkey PRIMARY KEY (location_id);

--

-- TOC entry 2721 (class 2606 OID 16486)

-- Name: publishing_house ph_check; Type: CHECK CONSTRAINT;
Schema: library; Owner: postgres

--

ALTER TABLE library.publishing_house

ADD CONSTRAINT ph_check CHECK ((ph_id > 0)) NOT VALID;

--

-- TOC entry 2743 (class 2606 OID 16449)

-- Name: publishing_house publishing_house_pkey; Type: CONSTRAINT;
Schema: library; Owner: postgres

--

ALTER TABLE ONLY library.publishing_house

ADD CONSTRAINT publishing_house_pkey PRIMARY KEY (ph_id);

--

-- TOC entry 2722 (class 2606 OID 16477)

-- Name: book r_1; Type: CHECK CONSTRAINT; Schema: library; Owner:
postgres

--

ALTER TABLE library.book

ADD CONSTRAINT r_1 CHECK ((book_id > 0)) NOT VALID;

--

-- TOC entry 2723 (class 2606 OID 16478)

-- Name: book r_2; Type: CHECK CONSTRAINT; Schema: library; Owner:
postgres

--

ALTER TABLE library.book

ADD CONSTRAINT r_2 CHECK ((tom_num > 0)) NOT VALID;

--

-- TOC entry 2724 (class 2606 OID 16479)

-- Name: book_r_3; Type: CHECK CONSTRAINT; Schema: library; Owner: postgres

--

ALTER TABLE library.book

ADD CONSTRAINT r_3 CHECK ((book_price > 0)) NOT VALID;

--

-- TOC entry 2725 (class 2606 OID 16480)

-- Name: book_r_4; Type: CHECK CONSTRAINT; Schema: library; Owner: postgres

--

ALTER TABLE library.book

ADD CONSTRAINT r_4 CHECK ((ph_id > 0)) NOT VALID;

--

-- TOC entry 2726 (class 2606 OID 16481)

-- Name: book_r_5; Type: CHECK CONSTRAINT; Schema: library; Owner: postgres

--

ALTER TABLE library.book

ADD CONSTRAINT r_5 CHECK ((isbn > 0)) NOT VALID;

```
--  
-- TOC entry 2727 (class 2606 OID 16520)  
-- Name: book r_6; Type: CHECK CONSTRAINT; Schema: library; Owner:  
postgres  
--
```

```
ALTER TABLE library.book  
    ADD CONSTRAINT r_6 CHECK ((publishing_date > '1500-01-01'::date))  
NOT VALID;
```

```
--  
-- TOC entry 2747 (class 2606 OID 16465)  
-- Name: book r_isbn; Type: CONSTRAINT; Schema: library; Owner:  
postgres  
--
```

```
ALTER TABLE ONLY library.book  
    ADD CONSTRAINT r_isbn UNIQUE (isbn) INCLUDE (isbn);
```

```
--  
-- TOC entry 2720 (class 2606 OID 16488)  
-- Name: reader read_1; Type: CHECK CONSTRAINT; Schema: library;  
Owner: postgres  
--
```

```
ALTER TABLE library.reader  
    ADD CONSTRAINT read_1 CHECK ((reader_id > 0)) NOT VALID;
```

--

-- TOC entry 2741 (class 2606 OID 16433)

-- Name: reader reader_pkey; Type: CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE ONLY library.reader

ADD CONSTRAINT reader_pkey PRIMARY KEY (reader_id);

--

-- TOC entry 2729 (class 2606 OID 16561)

-- Name: subscription sub_1; Type: CHECK CONSTRAINT; Schema:
library; Owner: postgres

--

ALTER TABLE library.subscription

ADD CONSTRAINT sub_1 CHECK ((subscription_id > 0)) NOT VALID;

--

-- TOC entry 2749 (class 2606 OID 16544)

-- Name: subscription subscription_id; Type: CONSTRAINT; Schema:
library; Owner: postgres

--

ALTER TABLE ONLY library.subscription

ADD CONSTRAINT subscription_id PRIMARY KEY (subscription_id);

--

-- TOC entry 2750 (class 2606 OID 16489)

-- Name: instance book_id; Type: FK CONSTRAINT; Schema: library;
Owner: postgres

--

ALTER TABLE ONLY library.instance

ADD CONSTRAINT book_id FOREIGN KEY (book_id) REFERENCES
library.book(book_id) NOT VALID;

--

-- TOC entry 2755 (class 2606 OID 16555)

-- Name: subscription instance_id; Type: FK CONSTRAINT; Schema:
library; Owner: postgres

--

ALTER TABLE ONLY library.subscription

ADD CONSTRAINT instance_id FOREIGN KEY (instance_id)
REFERENCES library.instance(instance_id);

--

-- TOC entry 2754 (class 2606 OID 16550)

-- Name: subscription librarian_id; Type: FK CONSTRAINT; Schema:
library; Owner: postgres

--

ALTER TABLE ONLY library.subscription

```
    ADD CONSTRAINT librarian_id FOREIGN KEY (librarian_id)
REFERENCES library.librarian(librarian_id);
```

```
--
```

```
-- TOC entry 2751 (class 2606 OID 16494)
```

```
-- Name: instance location_id; Type: FK CONSTRAINT; Schema: library;
Owner: postgres
```

```
--
```

```
ALTER TABLE ONLY library.instance
```

```
    ADD CONSTRAINT location_id FOREIGN KEY (location_id)
REFERENCES library.location(location_id) NOT VALID;
```

```
--
```

```
-- TOC entry 2752 (class 2606 OID 16472)
```

```
-- Name: book ph_id; Type: FK CONSTRAINT; Schema: library; Owner:
postgres
```

```
--
```

```
ALTER TABLE ONLY library.book
```

```
    ADD CONSTRAINT ph_id FOREIGN KEY (ph_id) REFERENCES
library.publishing_house(ph_id) NOT VALID;
```

```
--
```

```
-- TOC entry 2753 (class 2606 OID 16545)
```

```
-- Name: subscription reader_id; Type: FK CONSTRAINT; Schema: library;
Owner: postgres
```

--

```
ALTER TABLE ONLY library.subscription
```

```
    ADD CONSTRAINT reader_id FOREIGN KEY (reader_id)
REFERENCES library.reader(reader_id);
```

-- Completed on 2021-05-04 16:44:06

--

-- PostgreSQL database dump complete

--

Вывод

В ходе выполнения работы была создана база данных в PostgreSQL, были заданы ключи и ограничения, а также она была заполнена первичными данными. postgresql предоставляет возможность с удобством создать БД.