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«НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ ИТМО»
Факультет инфокоммуникационных технологий

ОТЧЕТ
О ЛАБОРАТОРНОЙ РАБОТЕ № 3

по теме:

«Создание таблиц базы данных POSTGRESQL. Заполнение таблиц рабочими данными»

по дисциплине: Проектирование и реализация баз данных

Специальность:
09.03.03 Мобильные и сетевые технологии

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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.

Предметная область: Вариант 16. БД "Спортивный клуб"

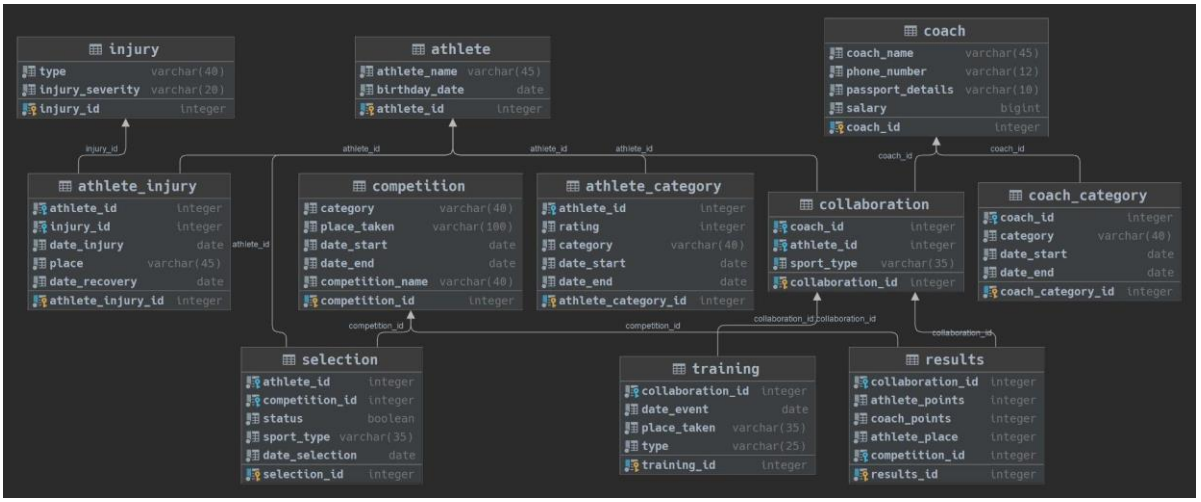

Рисунок 1 – ERD базы данных

Выполнение работы:

1. Создание схемы

```
CREATE SCHEMA sports_club;

ALTER SCHEMA sports_club OWNER TO postgres;
SET default_tablespace = '';
SET default_table_access_method = heap;
CREATE TABLE sports_club.athlete (
    athlete_id integer NOT NULL,
    athlete_name character varying(45) NOT NULL,
    birthday_date date NOT NULL
);
```

2. Создание таблиц

```
ALTER TABLE sports_club.athlete OWNER TO postgres;
CREATE SEQUENCE sports_club.athlete_athlete_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.athlete_athlete_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.athlete_athlete_id_seq OWNED BY
sports_club.athlete.athlete_id;
```

```
CREATE TABLE sports_club.athlete_category (
    athlete_category_id integer NOT NULL,
    athlete_id integer NOT NULL,
    rating integer NOT NULL,
    category character varying(40) NOT NULL,
    date_start date NOT NULL,
    date_end date NOT NULL,
    CONSTRAINT ch_date_end CHECK ((date_end > date_start)),
    CONSTRAINT ch_date_start CHECK ((date_start < now())),
    CONSTRAINT ch_rating CHECK ((rating > 0))
);

ALTER TABLE sports_club.athlete_category OWNER TO postgres;
CREATE SEQUENCE sports_club.athlete_category_athlete_category_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.athlete_category_athlete_category_id_seq OWNER TO postgres;
ALTER SEQUENCE sports_club.athlete_category_athlete_category_id_seq OWNED BY
sports_club.athlete_category.athlete_category_id;
```

```
CREATE TABLE sports_club.athlete_injury (
    athlete_injury_id integer NOT NULL,
    athlete_id integer NOT NULL,
    injury_id integer NOT NULL,
    date_injury date NOT NULL,
    place character varying(45) NOT NULL,
    date_recovery date NOT NULL,
    CONSTRAINT ch_date_injury CHECK ((date_injury < now())),
    CONSTRAINT ch_date_recovery CHECK ((date_recovery > date_injury))
);

ALTER TABLE sports_club.athlete_injury OWNER TO postgres;
CREATE SEQUENCE sports_club.athlete_injury_athlete_injury_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.athlete_injury_athlete_injury_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.athlete_injury_athlete_injury_id_seq OWNED BY
sports_club.athlete_injury.athlete_injury_id;
```

```
CREATE TABLE sports_club.coach (
    coach_id integer NOT NULL,
    coach_name character varying(45) NOT NULL,
    phone_number character varying(12) NOT NULL,
    passport_details character varying(10) NOT NULL,
    salary bigint NOT NULL
);

ALTER TABLE sports_club.coach OWNER TO postgres;
```

```
CREATE TABLE sports_club.coach_category (
    coach_category_id integer NOT NULL,
    coach_id integer NOT NULL,
    category character varying(40) NOT NULL,
    date_start date NOT NULL,
    date_end date NOT NULL,
    CONSTRAINT ch_date_end CHECK ((date_end > date_start)),
    CONSTRAINT ch_date_start CHECK ((date_start < now()))
);

ALTER TABLE sports_club.coach_category OWNER TO postgres;

CREATE SEQUENCE sports_club.coach_category_coach_category_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.coach_category_coach_category_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.coach_category_coach_category_id_seq OWNED BY
sports_club.coach_category.coach_category_id;

CREATE SEQUENCE sports_club.coach_coach_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.coach_coach_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.coach_coach_id_seq OWNED BY sports_club.coach.coach_id;
```

```
CREATE TABLE sports_club.collaboration (
    collaboration_id integer NOT NULL,
    coach_id integer NOT NULL,
    athlete_id integer NOT NULL,
    sport_type character varying(35) NOT NULL
);
```

```
ALTER TABLE sports_club.collaboration OWNER TO postgres;

CREATE SEQUENCE sports_club.collaboration_collaboration_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.collaboration_collaboration_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.collaboration_collaboration_id_seq OWNED BY
sports_club.collaboration.collaboration_id;
```

```
CREATE TABLE sports_club.competition (
    competition_id integer NOT NULL,
    category character varying(40) NOT NULL,
    place_taken character varying(100) NOT NULL,
    date_start date NOT NULL,
    date_end date NOT NULL,
    competition_name character varying(40) NOT NULL,
    CONSTRAINT ch_date_end CHECK ((date_end >= date_start))
);

ALTER TABLE sports_club.competition OWNER TO postgres;

CREATE SEQUENCE sports_club.competition_competition_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.competition_competition_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.competition_competition_id_seq OWNED BY
sports_club.competition.competition_id;
```

```
CREATE TABLE sports_club.injury (
    injury_id integer NOT NULL,
    type character varying(40) NOT NULL,
    injury_severity character varying(20) NOT NULL
);

ALTER TABLE sports_club.injury OWNER TO postgres;

CREATE SEQUENCE sports_club.injury_injury_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
```

```
    CACHE 1;

ALTER TABLE sports_club.injury_injury_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.injury_injury_id_seq OWNED BY sports_club.injury.injury_id;
```

```
CREATE TABLE sports_club.results (
    results_id integer NOT NULL,
    collaboration_id integer NOT NULL,
    athlete_points integer NOT NULL,
    coach_points integer NOT NULL,
    athlete_place integer NOT NULL,
    competition_id integer NOT NULL,
    CONSTRAINT ch_athlete_place CHECK ((athlete_place > 0))
);

ALTER TABLE sports_club.results OWNER TO postgres;

CREATE SEQUENCE sports_club.results_results_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.results_results_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.results_results_id_seq OWNED BY
sports_club.results.results_id;
```

```
CREATE TABLE sports_club.selection (
    selection_id integer NOT NULL,
    athlete_id integer NOT NULL,
    competition_id integer NOT NULL,
    status boolean NOT NULL,
    sport_type character varying(35) NOT NULL,
    date_selection date NOT NULL,
    CONSTRAINT ch_date_selection CHECK ((date_selection < now()))
);

ALTER TABLE sports_club.selection OWNER TO postgres;

CREATE SEQUENCE sports_club.selection_selection_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.selection_selection_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.selection_selection_id_seq OWNED BY
```

```
sports_club.selection.selection_id;
```

```
CREATE TABLE sports_club.training (
    training_id integer NOT NULL,
    "collaboration_id" integer NOT NULL,
    date_event date NOT NULL,
    place_taken character varying(35) NOT NULL,
    type character varying(25) NOT NULL
);

ALTER TABLE sports_club.training OWNER TO postgres;

CREATE SEQUENCE sports_club.training_training_id_seq
    AS integer
    START WITH 1
    INCREMENT BY 1
    NO MINVALUE
    NO MAXVALUE
    CACHE 1;

ALTER TABLE sports_club.training_training_id_seq OWNER TO postgres;

ALTER SEQUENCE sports_club.training_training_id_seq OWNED BY
sports_club.training.training_id;
```

3. Установка дефолтных значений для первичных ключей (nextval)

```
ALTER TABLE ONLY sports_club.athlete ALTER COLUMN athlete_id SET DEFAULT
nextval('sports_club.athlete_athlete_id_seq'::regclass);

ALTER TABLE ONLY sports_club.athlete_category ALTER COLUMN athlete_category_id SET
DEFAULT nextval('sports_club.athlete_category_athlete_category_id_seq'::regclass);

ALTER TABLE ONLY sports_club.athlete_injury ALTER COLUMN athlete_injury_id SET DEFAULT
nextval('sports_club.athlete_injury_athlete_injury_id_seq'::regclass);

ALTER TABLE ONLY sports_club.coach ALTER COLUMN coach_id SET DEFAULT
nextval('sports_club.coach_coach_id_seq'::regclass);

ALTER TABLE ONLY sports_club.coach_category ALTER COLUMN coach_category_id SET DEFAULT
nextval('sports_club.coach_category_coach_category_id_seq'::regclass);

ALTER TABLE ONLY sports_club.collaboration ALTER COLUMN collaboration_id SET DEFAULT
nextval('sports_club.collaboration_collaboration_id_seq'::regclass);

ALTER TABLE ONLY sports_club.competition ALTER COLUMN competition_id SET DEFAULT
nextval('sports_club.competition_competition_id_seq'::regclass);

ALTER TABLE ONLY sports_club.injury ALTER COLUMN injury_id SET DEFAULT
nextval('sports_club.injury_injury_id_seq'::regclass);

ALTER TABLE ONLY sports_club.results ALTER COLUMN results_id SET DEFAULT
nextval('sports_club.results_results_id_seq'::regclass);
```

```
ALTER TABLE ONLY sports_club.selection ALTER COLUMN selection_id SET DEFAULT
nextval('sports_club.selection_selection_id_seq'::regclass);

ALTER TABLE ONLY sports_club.training ALTER COLUMN training_id SET DEFAULT
nextval('sports_club.training_training_id_seq'::regclass);
```

4. Создание ограничений

```
ALTER TABLE ONLY sports_club.athlete_category
    ADD CONSTRAINT athlete_category_pkey PRIMARY KEY (athlete_category_id);

ALTER TABLE ONLY sports_club.athlete_injury
    ADD CONSTRAINT athlete_injury_pkey PRIMARY KEY (athlete_injury_id);

ALTER TABLE ONLY sports_club.athlete
    ADD CONSTRAINT athlete_pkey PRIMARY KEY (athlete_id);

ALTER TABLE sports_club.results
    ADD CONSTRAINT ch_athlete_points CHECK ((athlete_points >= 0)) NOT VALID;

ALTER TABLE sports_club.athlete
    ADD CONSTRAINT ch_birthday_date CHECK ((birthday_date < now())) NOT VALID;

ALTER TABLE sports_club.results
    ADD CONSTRAINT ch_coach_points CHECK ((coach_points >= 0)) NOT VALID;

ALTER TABLE sports_club.coach
    ADD CONSTRAINT ch_passport_details CHECK (((passport_details)::text ~
'^[0-9]{10}$'::text)) NOT VALID;

ALTER TABLE sports_club.coach
    ADD CONSTRAINT ch_phone_number CHECK (((phone_number)::text ~ '\+\d{11}'::text)) NOT
VALID;

ALTER TABLE sports_club.coach
    ADD CONSTRAINT ch_salary CHECK ((salary > 0)) NOT VALID;

ALTER TABLE ONLY sports_club.coach_category
    ADD CONSTRAINT coach_category_pkey PRIMARY KEY (coach_category_id);

ALTER TABLE ONLY sports_club.coach
    ADD CONSTRAINT coach_pkey PRIMARY KEY (coach_id);

ALTER TABLE ONLY sports_club.collaboration
    ADD CONSTRAINT collaboration_pkey PRIMARY KEY (collaboration_id);

ALTER TABLE ONLY sports_club.competition
    ADD CONSTRAINT competition_pkey PRIMARY KEY (competition_id);

ALTER TABLE ONLY sports_club.injury
    ADD CONSTRAINT injury_pkey PRIMARY KEY (injury_id);

ALTER TABLE ONLY sports_club.results
    ADD CONSTRAINT results_pkey PRIMARY KEY (results_id);
```

```
ALTER TABLE ONLY sports_club.selection
    ADD CONSTRAINT selection_pkey PRIMARY KEY (selection_id);

ALTER TABLE ONLY sports_club.training
    ADD CONSTRAINT training_pkey PRIMARY KEY (training_id);

ALTER TABLE ONLY sports_club.collaboration
    ADD CONSTRAINT un_collaboration UNIQUE (coach_id, athlete_id, sport_type);

ALTER TABLE ONLY sports_club.athlete_category
    ADD CONSTRAINT fk_athlete_id FOREIGN KEY (athlete_id) REFERENCES
sports_club.athlete(athlete_id) ON UPDATE CASCADE NOT VALID;

ALTER TABLE ONLY sports_club.collaboration
    ADD CONSTRAINT fk_athlete_id FOREIGN KEY (athlete_id) REFERENCES
sports_club.athlete(athlete_id) ON UPDATE CASCADE NOT VALID;

ALTER TABLE ONLY sports_club.athlete_injury
    ADD CONSTRAINT fk_athlete_id FOREIGN KEY (athlete_id) REFERENCES
sports_club.athlete(athlete_id) ON UPDATE CASCADE;

ALTER TABLE ONLY sports_club.selection
    ADD CONSTRAINT fk_athlete_id FOREIGN KEY (athlete_id) REFERENCES
sports_club.athlete(athlete_id) ON UPDATE CASCADE;

ALTER TABLE ONLY sports_club.coach_category
    ADD CONSTRAINT fk_coach_id FOREIGN KEY (coach_id) REFERENCES
sports_club.coach(coach_id) ON UPDATE CASCADE NOT VALID;

ALTER TABLE ONLY sports_club.collaboration
    ADD CONSTRAINT fk_coach_id FOREIGN KEY (coach_id) REFERENCES
sports_club.coach(coach_id) ON UPDATE CASCADE NOT VALID;

ALTER TABLE ONLY sports_club.results
    ADD CONSTRAINT fk_collaboration_id FOREIGN KEY (collaboration_id) REFERENCES
sports_club.collaboration(collaboration_id) ON UPDATE CASCADE;

ALTER TABLE ONLY sports_club.results
    ADD CONSTRAINT fk_competition_id FOREIGN KEY (competition_id) REFERENCES
sports_club.competition(competition_id) ON UPDATE CASCADE NOT VALID;

ALTER TABLE ONLY sports_club.selection
    ADD CONSTRAINT fk_competition_id FOREIGN KEY (competition_id) REFERENCES
sports_club.competition(competition_id) ON UPDATE CASCADE;

ALTER TABLE ONLY sports_club.athlete_injury
    ADD CONSTRAINT fk_injury_id FOREIGN KEY (injury_id) REFERENCES
sports_club.injury(injury_id) ON UPDATE CASCADE;

ALTER TABLE ONLY sports_club.training
    ADD CONSTRAINT "fk_collaboration_id" FOREIGN KEY ("collaboration_id") REFERENCES
sports_club.collaboration(collaboration_id) ON UPDATE CASCADE NOT VALID;
```

Выводы:

В данной работе изучались ключевые категории данных, применяемые при формировании таблиц, а также разнообразные ограничения и инструменты резервного копирования для баз данных. Работа по интеграции таблиц с рабочими данными была успешно проведена. Это требовало использования техники импорта данных из внешних ресурсов.

В ходе выполнения практической работы получены знания и умения по созданию таблиц в среде баз данных POSTGRESQL и их заполнению. Эти компетенции окажутся весьма полезными при проектировании и внедрении баз данных в рамках реальных задач.