Semestral work DBS 2025

Theme: Sports Complex Database

Authors: Oleksii Kolesnichenko, Serhii Zhyltsov

e-mails: **kolesole@fel.cvut.cz**, **zhyltser@fel.cvut.cz**

CP-0 Topic Statement + Bonus

Theme: Sports Complex Database

Motivation: The motivation is to simplify and accelerate the daily operations of the sports complex, solve issues with scheduling conflicts, payment transactions, and monitoring the use of individual sports facilities.

Short Description: This project focuses on the design and implementation of a database system for managing reservations in the sports complex, which includes group/solo trainings with trainer or without. The goal is to effectively digitize the process of reservations, payments, reservation collisions etc.

Taxonomic and Operational Scope: The proposed system will include several taxonomic levels (records of branches, sports halls, clients, trainers and trainings) and will handle operational data such as attendance at training sessions, payments.

Bonus: Detailed List of Entities and Relationships

Entities(WHO and WHAT):

1. **Branch** - **address**(city, street, house number)
2. **Sports Hall** - **name**, size, specialization
3. **User** - **login**, password
4. **Client** (derives from User) - preferences in sports
5. **Trainer** (derives from User) - specialization, education
6. **Personal Data** - **name**, **surname**, **date of birth**, **e-mail**, **phone number**
7. **Reservation** - status, reservation date
8. **Payment** - amount, payment date, payment method
9. **Training** - type, training date

Relationships(What does):

1. Branch **contains** Sports Halls
2. User **has** Personal data
3. Client **makes** Reservation
4. Client **makes** Payment
5. Trainer **is assistant** for trainer
6. Trainer **conducts** trainings
7. Reservation **includes** Payment
8. Reservation **applies to** Training
9. Training **takes place in** Sports hall

CP-1 Conceptual Model

Description: The Sports Complex Database System allows clients to book trainings, make payments, and manage their training schedules efficiently. Users register with a login and password, with clients selecting their preferences in sports and trainers managing their schedules. Reservations are linked to specific trainings and sports halls, ensuring availability and proper allocation of resources. Clients must complete payment using various methods before confirming their reservations. Trainers conduct sessions based on their specialization and may assist each other. Each training session has a defined training date, type, capacity, and price per participant(which make up the full price in Payment). The system ensures structured scheduling, preventing double bookings and optimizing trainer assignments. Personal data, including information about user(name, surname, date of birth, address, e-mail, phone number). This system provides an organized and seamless experience for managing trainings, payments and reservations.

ER Diagram:
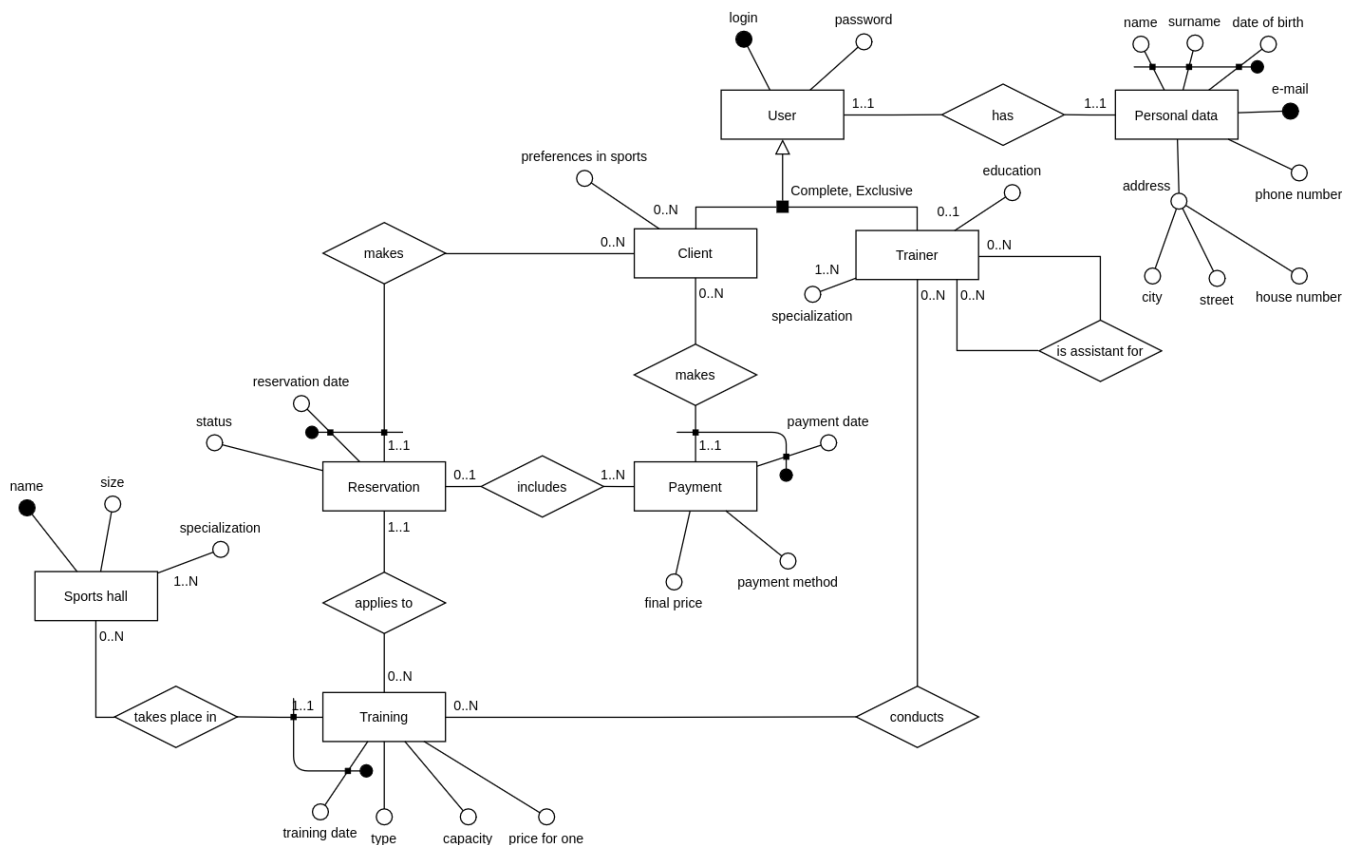
Entities:

1.**Sports Hall** - **<u>name</u>**, size, specialization(1..N)

2. **User** - **<u>login</u>**, password

3. **Client** (derives from User) - preferences in sports(0..N)

4. **Trainer** (derives from User) - specialization(1..N), education(0..1)

5. **Personal Data** - **<u>name</u>**, **<u>surname</u>**, **<u>date of birth</u>**, **<u>e-mail</u>**, phone number, address(city, street, house number)

6. **Reservation**(week entity: identified by Client + reservation date) - status, reservation date

7. **Payment**(week entity: identified by Client + payment date) - final price, payment date, payment method

8. **Training**(week entity: identified by Sports hall + training date) - type, training date, capacity, price for one

Relationships:

1. User **has** Personal data (1..1 - 1..1)

2. Client **makes** Reservation (0..N - 1..1)

3. Client **makes** Payment (0..N - 1..1)

4. Trainer **is assistant for** (recursion relationship) trainer (0..N - 0..N)

5. Trainer **conducts** trainings (0..N - 0..N)

6. Reservation **includes** Payment (0..1 - 1..N)

7. Reservation **applies to** Training (1..1 - 0..N)

8. Training **takes place in** Sports hall (1..1 - 0..N)

CP-2 Relational Model

Sports hall(<u>name</u>, size)
Hall specialization(<u>name, specialization</u>)
    FK: (name) ⊆ **Sports hall**(name)
User(<u>login</u>, password)
Personal data(name, surname, date of birth, <u>e-mail</u>, phone number, <u>login</u>)
    FK: (login) ⊆ **User**(login)
Address(<u>e-mail</u>, city, street, house number)
    FK: (e-mail) ⊆ **Personal data**(e-mail)
Client(<u>login</u>)
    FK: (login) ⊆ **User**(login)
Preferences in sports(<u>login, preferences in sports</u>)
    FK: (login) ⊆ **Client**(login)
Trainer(<u>login</u>)
    FK: (login) ⊆ **User**(login)
Trainer specialization(<u>login, name of sport</u>)
    FK: (login) ⊆ **Trainer**(login)
Education(<u>login</u>, education)
    FK: (login) ⊆ **Trainer**(login)
Is assistant for(<u>trainer, assistant</u>)
    FK: (trainer) ⊆ **Trainer**(login)
    FK: (assistant) ⊆ **Trainer**(login)
Training(<u>training date, name</u>, type, capacity, price for one)
    FK: (name) ⊆ **Sports hall**(name)
Conducts(<u>login, name, training date</u>)
    FK: (login) ⊆ **Trainer**(login)
    FK: (name, training date) ⊆ **Training**(name, training date)
Payment(final price, payment method, <u>payment date, login</u>)
    FK: (login) ⊆ **Client**(login)
Reservation(<u>reservation date, login</u>, status, training date, name)
    FK: (login) ⊆ **Client**(login)
    FK: (training date, name) ⊆ **Training**(training date, name)
ReservationPayment(<u>reservation date, login1, payment date, login2</u>)
    FK: (reservation date, login1) ⊆ **Reservation**(reservation date, login)
    FK: (payment date, login2) ⊆ **Payment**(payment date, login)