CS 353

2024-2025 Fall Semester

Final Report

Group 8

Umay Dündar 22202573

Murathan Işık 22103416

Ali Deniz Sözer 22202218

Damla İmre 22001640

Emre Uçar 22203675

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1. Introduction

Many use public pools, just like any facility that works with an entry registration system. Many people are registered to a pool system: Regulars, irregulars, people working in the facility, and admins. Managing a pool comes with many responsibilities, varying from registering users to the system, managing bookings of the lanes and pools, scheduling lessons, and generating reports to see details of this information. However, these attributes are hard to manage manually, as many active pool systems are currently used, posing a challenge. These challenges highlight the need for a robust, automated system to streamline pool activity management, helping users and administrators achieve smooth operations.

2. Description of The Application

In this project, we will create a pool facility system that serves many different users, such as member and nonmember swimmers, pool administrators, lifeguards, and coaches. In this application, all the swimmers can register for pool access and select lanes, book sessions, and register for swimming classes according to their level. Swimmers can also gain points that can be used to buy some items if they have a membership and they keep booking for the pool or registering for swimming classes. Swimmers can see their rating ranking among other swimmers in the system. Every swimmer can rate the swimming class coaches' instructor and see the coaches' overall rating. They can also comment on the swimming coaches' past performance. Swimmers and swimming coaches can see their swimming lesson schedules and available/unavailable daily time slots for accessing pools. Coaches can also see their ratings in the system. Administrators should be able to see coach ratings, feedback, swimmer points and rankings, available courses, and their course capacities. Admins can also generate reports for the demand of the pools with respect to their hours, most active members, and coach performances.

In this project, database usage is crucial since our application requires storing many different user types, their profile and lesson information and other necessary information like comments about coaches and courses or rating systems for member swimmers. Therefore, a database system is needed to handle all these data management tasks, including insertions, deletions, and modifications, according to the interaction of the user with the frontend part of our system.

3. Contribution of Each Member

3.1 Emre UÇAR

3.1.1 Proposal Report

- Have implemented introductions, limitations and partly ER diagram.
- Overall worked on the organization of the paper, which includes titles, spacing, justifying.

3.1.2 Design Report

- Redesigned ER diagram.
- Overall worked on the organization of the paper, which includes titles, spacing, justifying.

3.1.3 Implementation

- Have designed frontend first.
- Implemented the business logic of the project in general.
- Added Django views and connected the front and backend of chiefly swimmer user pages.

3.1.4 Final Report

- Revised ER diagram according to our implementation of the project and the feedback from the design report.
- Overall worked on the organization of the paper, which includes titles, spacing, justifying.

3.2 Murathan IŞIK

3.2.1 Proposal Report

- Helped other group members to draw first E/R design diagram

3.2.2 Design Report

- Helped others to revise E/R design diagram and UI design in Canva

3.3.3 Implementation

- I worked on the frontend design and connected the frontend to the backend for functionality on some pages, especially for admin pages for managing the database.

3.3 Umay DÜNDAR

3.3.1 Proposal Report

- I helped other group members to draw an E/R Design diagram.

- I wrote the functional requirements and limitations part of the proposal report.

3.3.2 Design Report

- I helped other group members to draw an E/R Design diagram.
- I created the UI design of the pages using Canva.
- I wrote the schema definitions according to our current database tables.

3.3.3 Implementation

- I mainly worked on the backend part of the project, and I worked on the connections between the front and back parts of the project. I wrote and fixed some axios queries of other frontend pages.

3.3.4 Final Report

- I mostly worked on implementation details and the user manual part of the final report.

3.4 Damla İMRE

3.4.1 Proposal Report

- Non-functional Requirements
- Functional Requirements
- E/R Design

3.4.2 Design Report

- E/R Design
- Table Schemas

3.4.3 Implementation

- I worked on the backend part of the project. I implemented some backend functions and worked on the connections between frontend and backend of the project.

3.4.4 Final Report

- Table Schemas

3.5 Ali Deniz SÖZER

3.5.1 Proposal Report

- I helped with creating the initial E/R diagram

3.5.2 Design Report

- I helped with revising the E/R diagram according to the feedback we received

3.5.3 Implementation

- I worked on the backend-frontend connections of the project. Mainly, I worked on the register, login and coach-related pages. I also worked on fixing the backend issues and adding new features.

3.5.4 Final Report

- I added the table schemas and created the user manual.

4. ER Diagram and Database Table Schemas

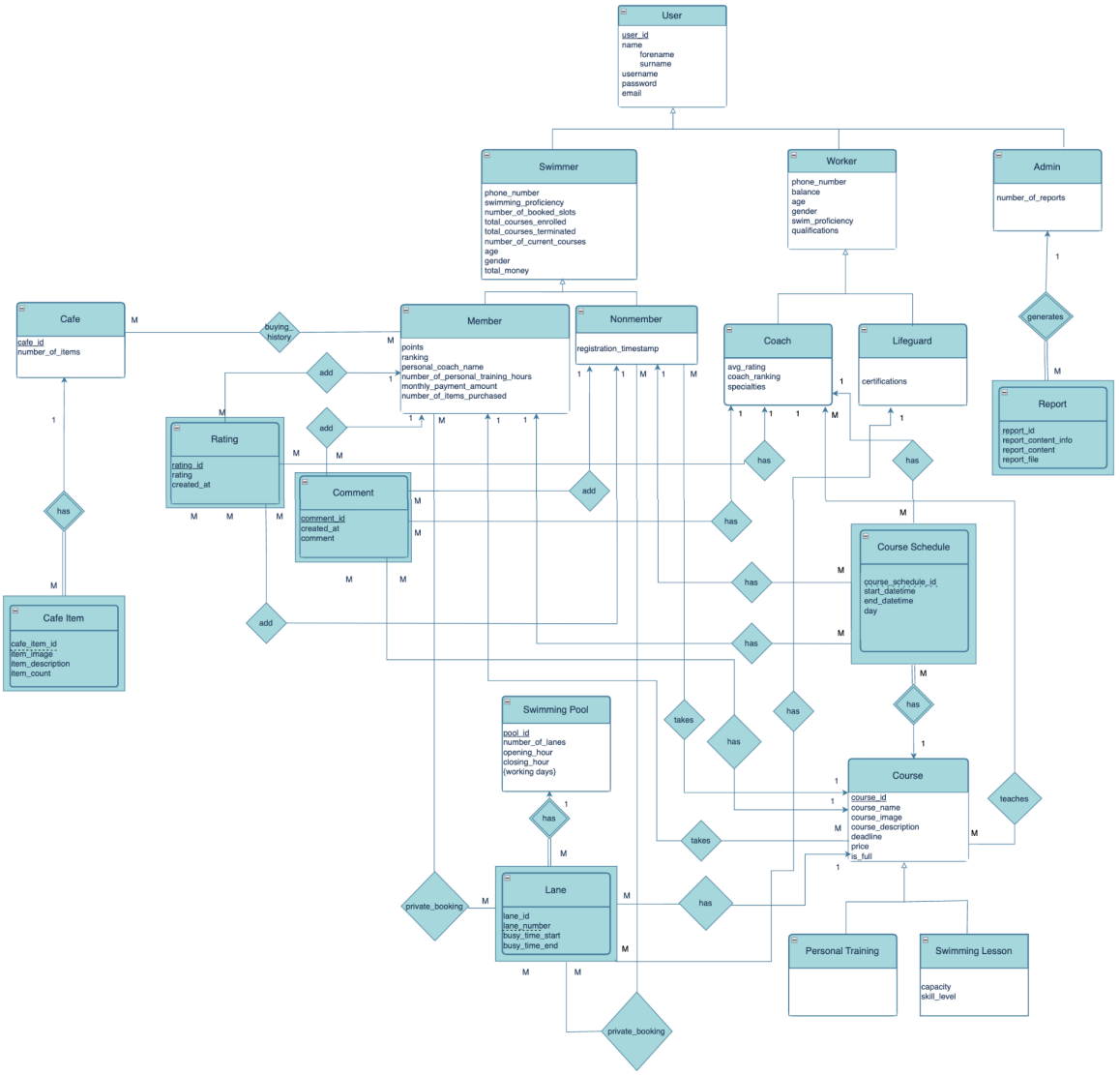
4.1 ER Diagram

4.1.1 ER Diagram Changes from Design Report

Here is a list of changes in our diagram from the previous version

- We decided to delete the time slot entity as it is redundant and storing a DATETIME attribute in the lane weak entity.
- *phone_number* attribute in Swimmer and Worker users are changed to single-valued attribute from multivariabled attribute.
- Worker's *qualifications* attribute is no longer a multivariabled attribute, changed to single-valued.
- Lifeguard's *certifications* attribute is no longer a multivariabled attribute, changed to single-valued.
- Rating and command entities are weak entities now.

4.1.2 Revised ER Diagram[1]



[1] https://drive.google.com/file/d/19T17ddcRAOtlJUwzh8Hsv1P1V_jbrDnp/view?usp=sharing

4.2 Table Schemas

4.2.1 all_users

Table Name: all_users

Relational Model: all_users(<u>user_id,</u> user_image, forename, surname, username, password, user_type, email)

Functional Dependencies: user_id -> user_image, forename, surname, username, password, user_type, email

Candidate Keys: {user_id}

Primary Key: user_id

Foreign Keys: none

Normal Form: BCNF

Table Definition:

```
CREATE TABLE all_users (
   user_id SERIAL PRIMARY KEY,
   user_image BYTEA,
   forename VARCHAR(255),
   surname VARCHAR(255),
   username VARCHAR(255),
   password VARCHAR(255),
   user_type VARCHAR(255),
   email VARCHAR(255) NOT NULL
);
```

4.2.2 swimmer

Table Name: swimmer

Relational Model: swimmer(swimmer_id, phone_number, age, gender, swimming_proficiency, number_of_booked_slots, total_courses_enrolled, total_courses_terminated, membership_status, total_money)

Functional Dependencies: swimmer_id -> phone_number, age, gender, swimming_proficiency, number_of_booked_slots, total_courses_enrolled, total_courses_terminated, membership_status, total_money

Candidate Keys: {swimmer_id}

Primary Key: swimmer_id

Foreign Keys: swimmer_id → all_users(user_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE swimmer (
   swimmer_id SERIAL PRIMARY KEY,
   phone_number VARCHAR(15),
   age INT,
   gender VARCHAR(100),
   swimming_proficiency VARCHAR(100),
   number_of_booked_slots INT,
   total_courses_enrolled INT,
   total_courses_terminated INT,
   membership_status VARCHAR(255),
   total_money INT,
   FOREIGN KEY (swimmer_id) REFERENCES all_users(user_id),
   check(swimming_proficiency in ('Beginner', 'Intermediate', 'Advanced'))
);
```

4.2.3 member_swimmer

Table Name: member_swimmer

Relational Model: member_swimmer(swimmer_id, points, monthly_payment_amount, number_of_personal_training_hours, ranking, number_of_items_purchased, personal_coach_id)

Functional Dependencies: swimmer_id -> points, monthly_payment_amount, number_of_personal_training_hours, ranking, number_of_items_purchased, personal_coach_id

Candidate Keys: {swimmer_id}

Primary Key: swimmer_id

Foreign Keys: swimmer_id → swimmer(swimmer_id)
personal_coach_id → coach(coach_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE member_swimmer(
   swimmer_id SERIAL PRIMARY KEY,
   points INT,
   monthly_payment_amount INT,
   number_of_personal_training_hours INT,
   ranking INT,
   number_of_items_purchased INT,
   personal_coach_id INT,
   FOREIGN KEY (swimmer_id) REFERENCES swimmer(swimmer_id),
   FOREIGN KEY (personal_coach_id) REFERENCES coach(coach_id)
);
```

4.2.4 nonmember_swimmer

Table Name: nonmember_swimmer

Relational Model: nonmember_swimmer(swimmer_id, registration_timestamp)

Functional Dependencies: swimmer_id → registration_timestamp

Candidate Keys: {swimmer_id}, {registration_timestamp}

Primary Key: {swimmer_id}

Foreign Keys: swimmer_id → swimmer(swimmer_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE nonmember_swimmer (
   swimmer_id SERIAL PRIMARY KEY,
   registration_timestamp TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
   FOREIGN KEY (swimmer_id) REFERENCES swimmer(swimmer_id)
);
```

4.2.5 swimming_pool

Table Name: swimming_pool

Relational Model: swimming_pool(<u>pool_id</u>, number_of_lanes, opening_hour, closing_hour, working_days, location)

Functional Dependencies: pool_id → number_of_lanes, opening_hour, closing_hour, working_days, location

Candidate Keys: {pool_id}

Primary Key: pool_id

Foreign Keys:

Normal Form: BCNF

Table Definition:

```
CREATE TABLE swimming_pool (
        pool_id SERIAL PRIMARY KEY,
        number_of_lanes INT NOT NULL,
        opening_hour TIME NOT NULL,
        closing_hour TIME NOT NULL,
        working_days TEXT NOT NULL,
        location TEXT
);
```

4.2.6 worker

Table Name: worker

Relational Model: worker(<u>worker_id</u>, pool_id, age, gender, phone_number, qualifications, balance)

Functional Dependencies: worker_id → pool_id, age, gender, phone_number, qualifications, balance

Candidate Keys: {worker_id}

Primary Key: worker_id

Foreign Keys: worker_id → all_users(user_id)
pool_id → swimming_pool(pool_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE worker (
   worker_id SERIAL PRIMARY KEY,
   pool_id INT,
   age INT,
   gender VARCHAR(100),
   phone_number VARCHAR(15),
   qualifications TEXT,
   balance INT,
   FOREIGN KEY (worker_id) REFERENCES all_users(user_id),
   FOREIGN KEY (pool_id) REFERENCES swimming_pool(pool_id),
   check(gender in ('Male', 'Female'))
);
```

4.2.7 coach

Table Name: coach

Relational Model: coach(coach_id, avg_rating, coach_ranking, specialties)

Functional Dependencies: coach_id → avg_rating, coach_ranking, specialties

Candidate Keys: {coach_id}

Primary Key: coach_id

Foreign Keys: coach_id → worker(worker_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE coach (
   coach_id SERIAL PRIMARY KEY,
   avg_rating FLOAT,
   coach_ranking INT,
   specialties TEXT,
   FOREIGN KEY (coach_id) REFERENCES worker(worker_id)
);
```

4.2.8 lifeguard

Table Name: lifeguard

Relational Model: lifeguard(<u>lifeguard_id</u>, certifications)

Functional Dependencies: lifeguard_id → certifications

Candidate Keys: {lifeguard_id}

Primary Key: lifeguard_id

Foreign Keys: lifeguard_id → worker(worker_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE lifeguard (
   lifeguard_id SERIAL PRIMARY KEY,
   certifications TEXT,
   FOREIGN KEY (lifeguard_id) REFERENCES worker(worker_id)
);
```

4.2.9 administrator

Table Name: administrator

Relational Model: administrator(<u>administrator_id</u>, number_of_reports)

Functional Dependencies: administrator_id → number_of_reports

Candidate Keys: {administrator_id}

Primary Key: administrator_id

Foreign Keys:administrator_id → all_users(user_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE administrator (
   administrator_id SERIAL PRIMARY KEY,
   number_of_reports INT,
   FOREIGN KEY (administrator_id) REFERENCES all_users(user_id)
);
```

4.2.10 lane

Table Name: lane

Relational Model: lane(<u>lane_id</u>, pool_id, lane_number, lifeguard_id, start_time, end_time, booking_price, start_date, end_date, availability)

Functional Dependencies: lane_id → pool_id, lane_number, lifeguard_id, start_time, end_time, booking_price, start_date, end_date, availability

Candidate Keys: {lane_id}

Primary Key: lane_id

Foreign Keys: pool_id → swimming_pool(pool_id)
lifeguard_id → lifeguard(lifeguard_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE lane(
   lane_id SERIAL,
   pool_id INT,
   lane_number INT,
   lifeguard_id INT,
   start_time TIME,
   end_time TIME,
   booking_price INT,
   start_date DATE,
   end_date DATE,
   availability VARCHAR(255),
   FOREIGN KEY (pool_id) REFERENCES swimming_pool(pool_id),
   FOREIGN KEY (lifeguard_id) REFERENCES lifeguard(lifeguard_id),
   UNIQUE (lane_id),
   PRIMARY KEY (lane_id, pool_id),
   CHECK (availability IN ('available', 'added-to-cart', 'in-use'))
);
```

4.2.11 report

Table Name: report

Relational Model: report(report_id, admin_id, report_content_info, report_content, report_file)

Functional Dependencies: report_id → admin_id, report_content_info, report_content, report_file

Candidate Keys: {report_id}

Primary Key: report_id

Foreign Keys: admin_id → administration(admin_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE report (
   report_id SERIAL PRIMARY KEY,
   admin_id INT,
   report_content_info VARCHAR(255),
   report_content TEXT,
   report_file BYTEA,
   FOREIGN KEY (admin_id) REFERENCES administrator(administrator_id)
);
```

4.2.12 course

Table Name: course

Relational Model: course(course_id, course_name, coach_id, course_description, date, start_time, end_time, restrictions, pool_id, lane_id, price, capacity)

Functional Dependencies: course_id → course_name, coach_id, course_description, date, start_time, end_time, restrictions, pool_id, lane_id, price, capacity

Candidate Keys: {course_id }

Primary Key: course_id

Foreign Keys: coach_id → coach(coach_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE course (
   course_id SERIAL PRIMARY KEY,
   course_name VARCHAR(255) NOT NULL,
   coach_id INT NOT NULL,
   course_description TEXT,
   date DATE NOT NULL,
   start_time TIME NOT NULL,
   end_time TIME NOT NULL,
   restrictions VARCHAR(255),
   pool_id INT NOT NULL,
   lane_id INT NOT NULL,
   price INT NOT NULL,
   capacity INT NOT NULL,
   FOREIGN KEY (coach_id) REFERENCES coach(coach_id)
);
```

4.2.13 course_schedule

Table Name: course_schedule

Relational Model: course(course_schedule_id, course_id, swimmer_id, coach_id, start_time, end_time, status, day)

Functional Dependencies: course_schedule_id → course_id, swimmer_id, coach_id, start_time, end_time, status, day

Candidate Keys: {course_schedule_id}

Primary Key: course_schedule_id, course_id

Foreign Keys: coach_id → coach(coach_id)
swimmer_id → swimmer(swimmer_id)
course_id → course(course_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE course_schedule (
   course_schedule_id SERIAL,
   course_id INT,
   swimmer_id INT,
   coach_id INT,
   start_time TIME NOT NULL,
   end_time TIME NOT NULL,
   status TEXT,
   day TEXT NOT NULL,
   FOREIGN KEY (swimmer_id) REFERENCES swimmer(swimmer_id),
   FOREIGN KEY (coach_id) REFERENCES coach(coach_id),
   FOREIGN KEY (course_id) REFERENCES course(course_id),
   PRIMARY KEY (course_schedule_id, course_id),
   CHECK (status IN ('not-enrolled', 'in-progress', 'withdrawn', 'finished', 'cancelled')),
   CHECK (day IN ('Sunday', 'Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday',
'Saturday'))
);
```

4.2.14 personal_training

Table Name: personal_training

Relational Model: personal_training(training_id)

Functional Dependencies: training_id → training_id

Candidate Keys: {training_id}

Primary Key: training_id

Foreign Keys: training_id → course(course_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE personal_training (
   training_id SERIAL PRIMARY KEY,
   FOREIGN KEY (training_id) REFERENCES course(course_id)
);
```

4.2.15 swimming_lesson

Table Name: swimming_lesson

Relational Model: swimming_lesson(<u>lesson_id</u>, capacity, is_full, skill_level)

Functional Dependencies: lesson_id → capacity, is_full, skill_level

Candidate Keys: {lesson_id}

Primary Key: lesson_id

Foreign Keys: lesson_id → course(course_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE swimming_lesson (
   lesson_id SERIAL PRIMARY KEY,
   capacity INT NOT NULL,
   is_full BOOLEAN NOT NULL,
   skill_level TEXT,
   FOREIGN KEY (lesson_id) REFERENCES course(course_id),
   CHECK (skill_level IN ('beginner', 'intermediate', 'advanced'))
);
```

4.2.16 cafe

Table Name: cafe

Relational Model: cafe(<u>cafe_id</u>, number_of_items, pool_id)

Functional Dependencies: cafe_id → number_of_items, pool_id

Candidate Keys: {cafe_id}

Primary Key: cafe_id

Foreign Keys: pool_id → swimming_pool(pool_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE cafe (
   cafe_id SERIAL PRIMARY KEY,
   number_of_items INT,
   pool_id INT,
   FOREIGN KEY (pool_id) REFERENCES swimming_pool(pool_id)
);
```

4.2.17 cafe_item

Table Name: cafe_item

Relational Model: cafe_item(cafe_item_id, cafe_id, item_image, item_name, item_description, item_count, price)

Functional Dependencies: cafe_item_id, cafe_id → item_image, item_name, item_description, item_count, price

Candidate Keys: {(cafe_item_id, cafe_id)}

Primary Key: cafe_item_id, cafe_id

Foreign Keys: cafe_id → cafe(cafe_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE cafe_item (
   cafe_item_id SERIAL,
   cafe_id INT NOT NULL,
   item_image BYTEA,
   item_name VARCHAR(255),
   item_description VARCHAR(255),
   item_count INT,
   price INT,
   FOREIGN KEY (cafe_id) REFERENCES cafe(cafe_id),
   UNIQUE(cafe_item_id),
   PRIMARY KEY (cafe_item_id, cafe_id)
);
```

4.2.18 rating

Table Name: rating

Relational Model: rating(<u>rating_id, course_id</u>, swimmer_id, coach_id, rating, created_at)

Functional Dependencies: rating_id, course_id → swimmer_id, coach_id, rating, created_at

Candidate Keys: {(rating_id, course_id)}

Primary Key: rating_id, course_id

Foreign Keys: swimmer_id → swimmer(swimmer_id)
coach_id → coach(coach_id)
course_id → coach(course_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE rating(
   rating_id SERIAL,
   swimmer_id INT NOT NULL,
   coach_id INT NOT NULL,
   course_id INT NOT NULL,
   rating INT CHECK (rating BETWEEN 1 AND 5),
   created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
   FOREIGN KEY (swimmer_id) REFERENCES swimmer(swimmer_id),
   FOREIGN KEY (coach_id) REFERENCES coach(coach_id),
   FOREIGN KEY (course_id) REFERENCES course(course_id),
   PRIMARY KEY (rating_id, course_id)
);
```

4.2.19 comment

Table Name: comment

Relational Model: comment(<u>comment_id, course_id</u>, swimmer_id, coach_id, comment, created_at)

Functional Dependencies: comment_id, course_id → swimmer_id, coach_id, comment, created_at

Candidate Keys: {(comment_id, course_id)}

Primary Key: comment_id, course_id

Foreign Keys: swimmer_id → swimmer(swimmer_id)
coach_id → coach(coach_id)
course_id → coach(course_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE comment(
   comment_id SERIAL,
   swimmer_id INT NOT NULL,
   coach_id INT NOT NULL,
   course_id INT NOT NULL,
   comment VARCHAR(255),
   created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
   FOREIGN KEY (swimmer_id) REFERENCES swimmer(swimmer_id),
   FOREIGN KEY (coach_id) REFERENCES coach(coach_id),
   FOREIGN KEY (course_id) REFERENCES course(course_id),
   PRIMARY KEY (comment_id, course_id)
);
```

4.2.20 cart

Table Name: cart

Relational Model: cart(cart_id, purchaser_id, course_id, cafe_item_id, cafe_id, lane_id)

Functional Dependencies: comment_id, course_id → swimmer_id, coach_id, comment, created_at

Candidate Keys: {(comment_id, course_id)}

Primary Key: comment_id, course_id

Foreign Keys: swimmer_id → swimmer(swimmer_id)
coach_id → coach(coach_id)
course_id → coach(course_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE cart (
   cart_id SERIAL PRIMARY KEY,
   purchaser_id INT NOT NULL,
   course_id INT,
   cafe_item_id INT,
   cafe_id INT,
   lane_id INT,
   FOREIGN KEY (purchaser_id) REFERENCES swimmer(swimmer_id),
   FOREIGN KEY (course_id) REFERENCES course(course_id),
   FOREIGN KEY (cafe_item_id) REFERENCES cafe_item(cafe_item_id),
   FOREIGN KEY (cafe_id) REFERENCES cafe(cafe_id),
   FOREIGN KEY (lane_id) REFERENCES lane(lane_id)
);
```

4.2.21 private_booking

Table Name: private_booking

Relational Model: private_booking(private_booking_id, swimmer_id, lane_id, booking_date, start_time, end_time, status)

Functional Dependencies: (private_booking_id, swimmer_id)
-> lane_id, booking_date, start_time, end_time, status

Candidate Keys: { (private_booking_id, swimmer_id) }

Primary Key:(private_booking_id, swimmer_id)

Foreign Keys: swimmer_id → swimmer(swimmer_id)
lane_id → lane(lane_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE private_booking (
   private_booking_id SERIAL,
   swimmer_id        INT,
   lane_id           INT,
   booking_date      DATE NOT NULL,
   start_time        TIME,
   end_time          TIME,
   status            VARCHAR(50) DEFAULT 'active',
   FOREIGN KEY (swimmer_id) REFERENCES swimmer(swimmer_id),
   FOREIGN KEY (lane_id)    REFERENCES lane(lane_id),
   UNIQUE (swimmer_id, lane_id, start_time, end_time),
   PRIMARY KEY (private_booking_id, swimmer_id)
);
```

4.2.22 teaches

Table Name: teaches

Relational Model: teaches(<u>teaches_id</u>, lesson_id, coach_id)

Functional Dependencies: teaches_id → lesson_id, coach_id

Candidate Keys: {teaches_id}

Primary Key: teaches_id

Foreign Keys: lesson_id → swimming_lesson(lesson_id)
coach_id → coach(coach_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE teaches (
   teaches_id SERIAL PRIMARY KEY,
   lesson_id INT,
   coach_id INT,
   FOREIGN KEY (lesson_id) REFERENCES swimming_lesson(lesson_id),
   FOREIGN KEY (coach_id) REFERENCES coach(coach_id)
);
```

4.2.23 buying_history

Table Name: buying_history

Relational Model: buying_history(<u>history_id</u>, purchaser_id, course_id, cafe_item_id, cafe_id, lane_id)

Functional Dependencies: history_id → purchaser_id, course_id, cafe_item_id, cafe_id, lane_id

Candidate Keys: {history_id}

Primary Key: history_id

Foreign Keys: purchaser_id → swimmer(swimmer_id)
course_id → course(course_id)
cafe_item_id → cafe_item(cafe_item_id)
cafe_id → cafe(cafe_id)
lane_id → lane(lane_id)

Normal Form: BCNF

Table Definition:

```
CREATE TABLE buying_history (
   history_id SERIAL PRIMARY KEY,
   purchaser_id INT NOT NULL,
   course_id INT,
   cafe_item_id INT,
   cafe_id INT,
   lane_id INT,
   purchased_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
   FOREIGN KEY (purchaser_id) REFERENCES swimmer(swimmer_id),
   FOREIGN KEY (course_id) REFERENCES course(course_id),
   FOREIGN KEY (cafe_item_id) REFERENCES cafe_item(cafe_item_id),
   FOREIGN KEY (cafe_id) REFERENCES cafe(cafe_id),
   FOREIGN KEY (lane_id) REFERENCES lane(lane_id)
);
```

5. Implementation Details

This project implementation is based on **React** for the frontend, **Django** for the backend, and **PostgreSQL** for the database. Our project's backend runs at port 8000, while our project's frontend runs from port 3000 and our database server runs on port 5432. Between these two components, we send queries by using Axios get and post requests, that return JSON responses. To configure these, we changed the database settings in django backend applications settings.py file. To create tables, we create management commands and run python manage.py create_tables. In python manage.py create_tables, we execute the create_tables.sql file, which contains table definitions. Nevertheless, to drop tables, we also create the delete_tables management command, which runs the delete_tables.sql file through Python code and drops all tables. We use Django views and cursor.execute() to run raw SQL queries in order to manipulate tables. Our queries contain select, aggregation functions, group by, cases, join, insert, delete, and update statements.

6.1 Constraints:

We use check statements in our SQL table definitions and make sure the right value is inserted into our tables. Also, we use NOT NULL and UNIQUE constraints to make sure

Example SQL check statements from our source code (NOT NULL, UNIQUE and CHECK statements are marked as bold)

```
CREATE TABLE worker (

    worker_id SERIAL PRIMARY KEY,

    pool_id INT,

    age INT,

    gender VARCHAR(100),

    phone_number VARCHAR(15),

    qualifications TEXT,

    balance INT,

    FOREIGN KEY (worker_id) REFERENCES all_users(user_id),

    FOREIGN KEY (pool_id) REFERENCES swimming_pool(pool_id),

    check(gender in ('Male', 'Female'))

);

 CREATE SEQUENCE lane_id_seq START 1;

CREATE TABLE lane(

    lane_id INT DEFAULT nextval('lane_id_seq'),,

    pool_id INT,

    lane_number INT,

    lifeguard_id INT,

    start_time TIME,

    end_time TIME,

    booking_price INT,

    start_date DATE,
```

```
    end_date DATE,
    availability VARCHAR(255),
    FOREIGN KEY (pool_id) REFERENCES swimming_pool(pool_id),
    FOREIGN KEY (lifeguard_id) REFERENCES lifeguard(lifeguard_id),
    UNIQUE (lane_id),
    PRIMARY KEY (lane_id, pool_id),
    CHECK (availability IN ('available', 'added-to-cart', 'in-use'))
);

CREATE TABLE swimmer (
    swimmer_id SERIAL PRIMARY KEY,
    phone_number VARCHAR(15),
    age INT,
    gender VARCHAR(100),
    swimming_proficiency VARCHAR(100),
    number_of_booked_slots INT,
    total_courses_enrolled INT,
    total_courses_terminated INT,
    membership_status VARCHAR(255),
    total_money INT,
    FOREIGN KEY (swimmer_id) REFERENCES all_users(user_id),
    check(swimming_proficiency in ('Beginner', 'Intermediate', 'Advanced'))
);
CREATE TABLE course (
    course_id SERIAL PRIMARY KEY,
    course_name VARCHAR(255) NOT NULL,
```

```
    coach_id INT NOT NULL,
    course_description TEXT,
    date DATE NOT NULL,
    start_time TIME NOT NULL,
    end_time TIME NOT NULL,
    restrictions VARCHAR(255),
    pool_id INT NOT NULL,
    lane_id INT NOT NULL,
    price INT NOT NULL,
    capacity INT NOT NULL,
    FOREIGN KEY (coach_id) REFERENCES coach(coach_id)
);

CREATE TABLE course_schedule(
    course_schedule_id SERIAL,
    course_id INT,
    swimmer_id INT,
    coach_id INT,
    start_time TIME NOT NULL,
    end_time TIME NOT NULL,
    status VARCHAR(255),
    day VARCHAR(255),
    FOREIGN KEY (swimmer_id) REFERENCES swimmer(swimmer_id),
    FOREIGN KEY (coach_id) REFERENCES coach(coach_id),
    FOREIGN KEY (course_id) REFERENCES course(course_id),
    PRIMARY KEY (course_schedule_id, course_id),
```

```
    CHECK (status IN ('not-enrolled', 'in-progress', 'withdrawn', 'finished', 'cancelled'))
);
 CREATE TABLE swimming_lesson (
    lesson_id SERIAL PRIMARY KEY,
    capacity INT NOT NULL,
    is_full BOOLEAN NOT NULL,
    skill_level TEXT,
    FOREIGN KEY (lesson_id) REFERENCES course(course_id),
    CHECK (skill_level IN ('beginner', 'intermediate', 'advanced'))
);
CREATE TABLE private_booking (
    private_booking_id SERIAL,
    swimmer_id INT,
    lane_id INT,
    booking_date DATE NOT NULL,
    start_time TIME,
    end_time TIME,
    status VARCHAR(50) DEFAULT 'active',
    FOREIGN KEY (swimmer_id) REFERENCES swimmer(swimmer_id),
    FOREIGN KEY (lane_id) REFERENCES lane(lane_id),
    UNIQUE (swimmer_id, lane_id, start_time, end_time),
    PRIMARY KEY (private_booking_id, swimmer_id)
);
```

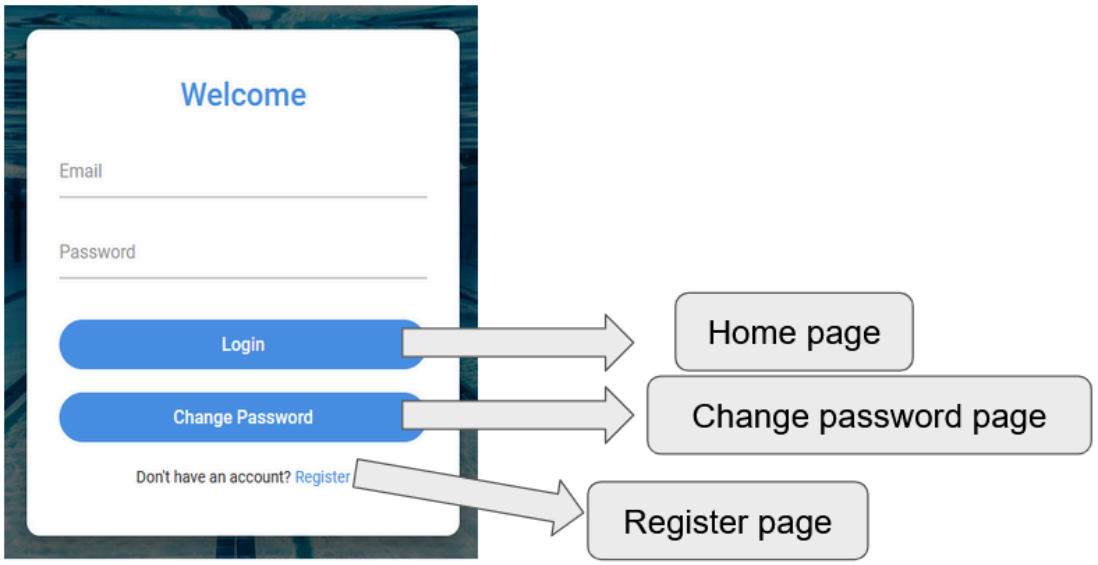
7. Users Manual

7.1 Build Instructions

- You can clone our repository manually through the command line or by using GitHub Desktop or gitKraken in your local folder.
- After cloning the repository, create a python venv. virtual environment using python -m venv venv command
- Activate your virtual environment using source venv/bin/activate # On Windows, use venv\Scripts\activate
- Make sure you have pip, python, Django, django-rest-framework, psycopg or psycopg2-binary installed in your virtual environment.
- If these dependencies are not installed, you can install them using pip install command.
- Then open the frontend folder of the project and make sure you have npm and npx on your environment.
- Then, install all the dependencies by using npm install command.
- To create tables, you can use python manage.py create_tables command.
- Then, to make migrations, run python manage.py makemigrations and python manage.py migrate commands to be able to use Django sessions.
- If you want to drop tables to recreate again you can use python manage.py delete_tables command.
- After that, you can start your backend server by running python manage.py runserver and you can start the frontend of your application by running npm start at your frontend folder. Make sure you do these things on different terminals so they can run together.

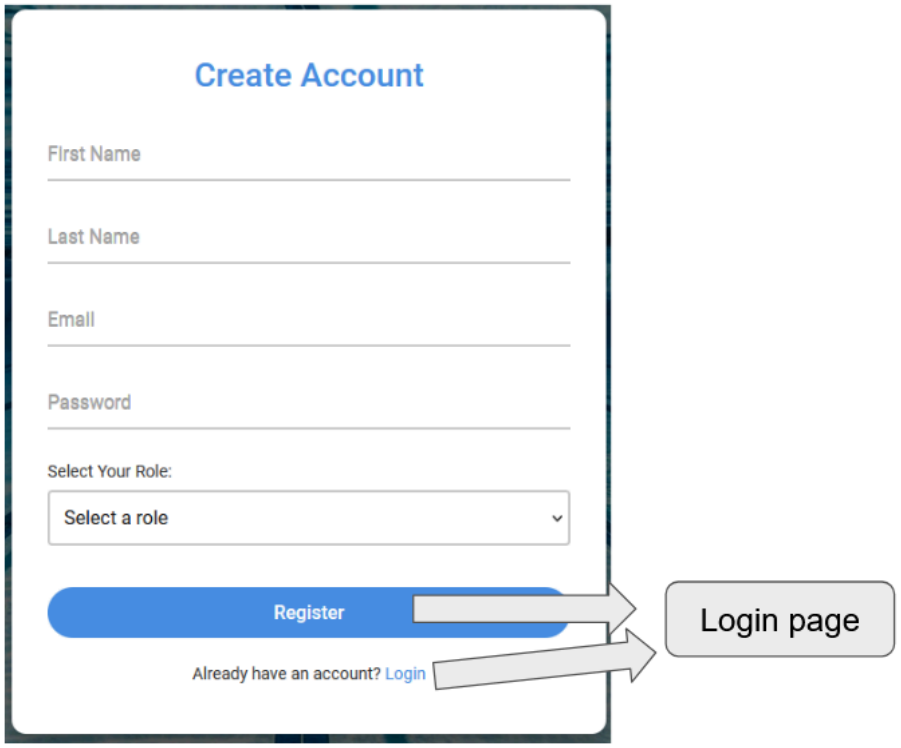
7.2 Login Page

All users use the same login page. They can use the email and password they used while registering to log in to the website. When logged in successfully, the user will go to a home page determined by their role.



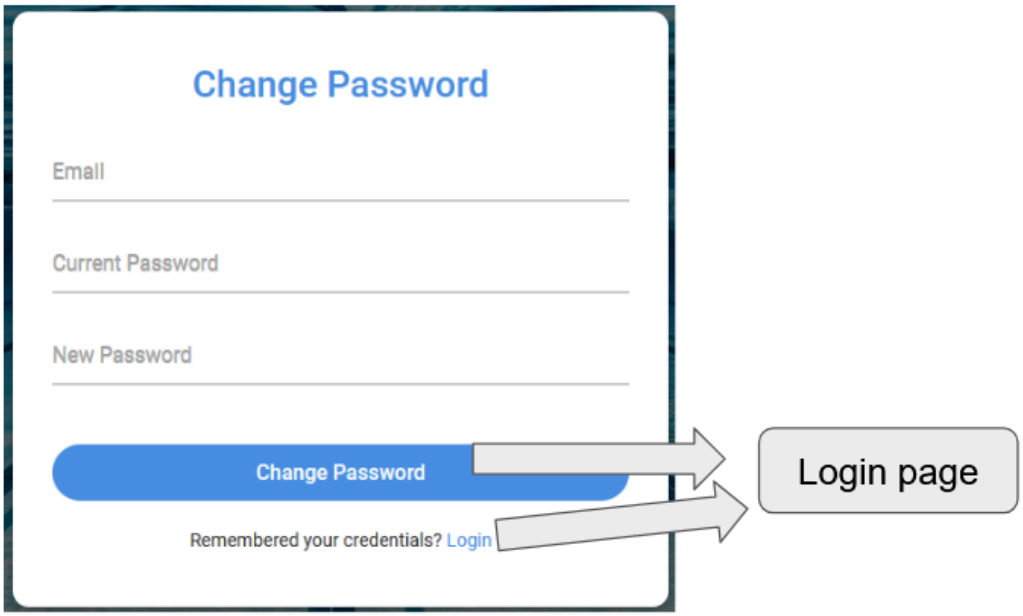
7.3 Register Page

Users can register by entering their information and selecting their role (swimmer, coach, and lifeguard)

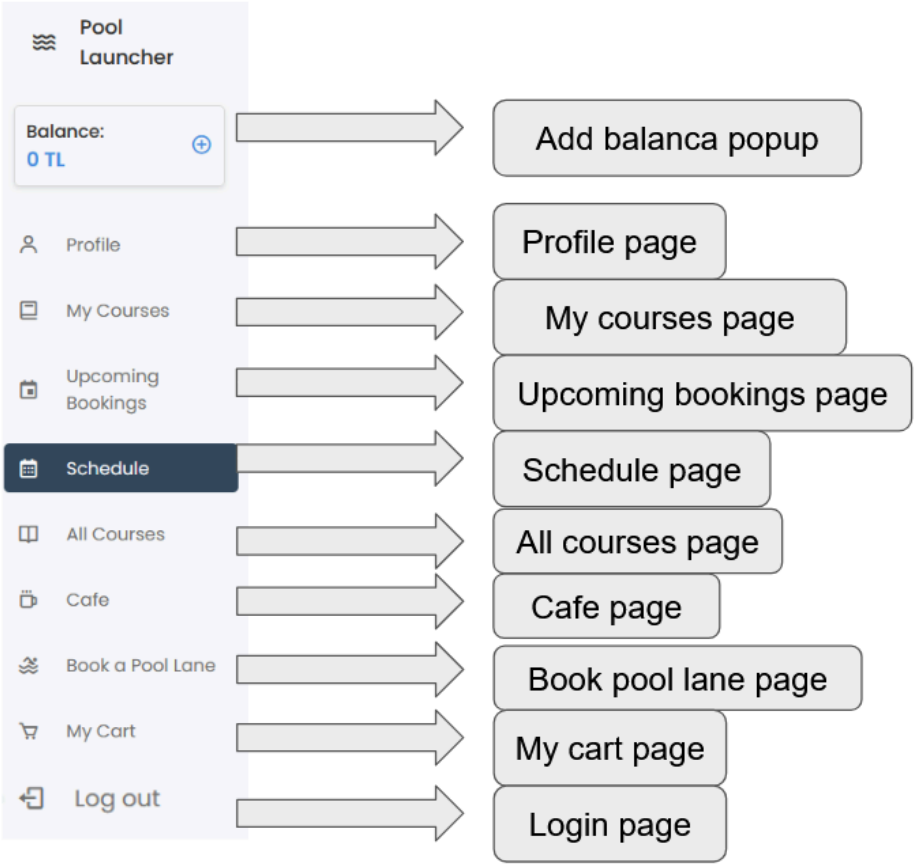


7.4 Change Password Page

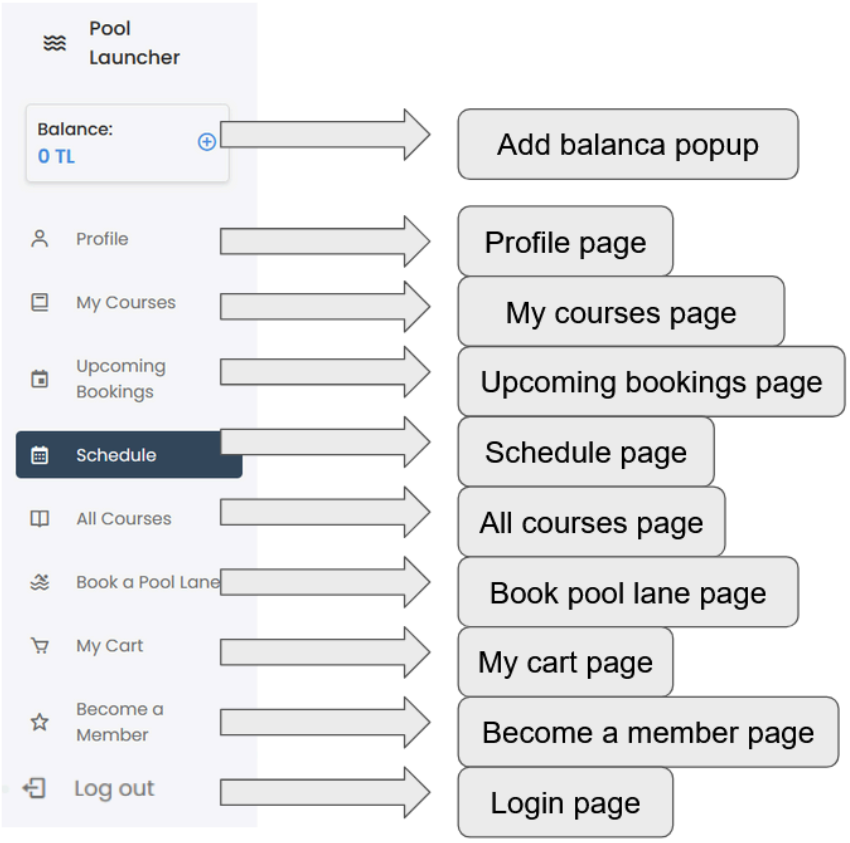
Users can change their password by filling out the form on the left.



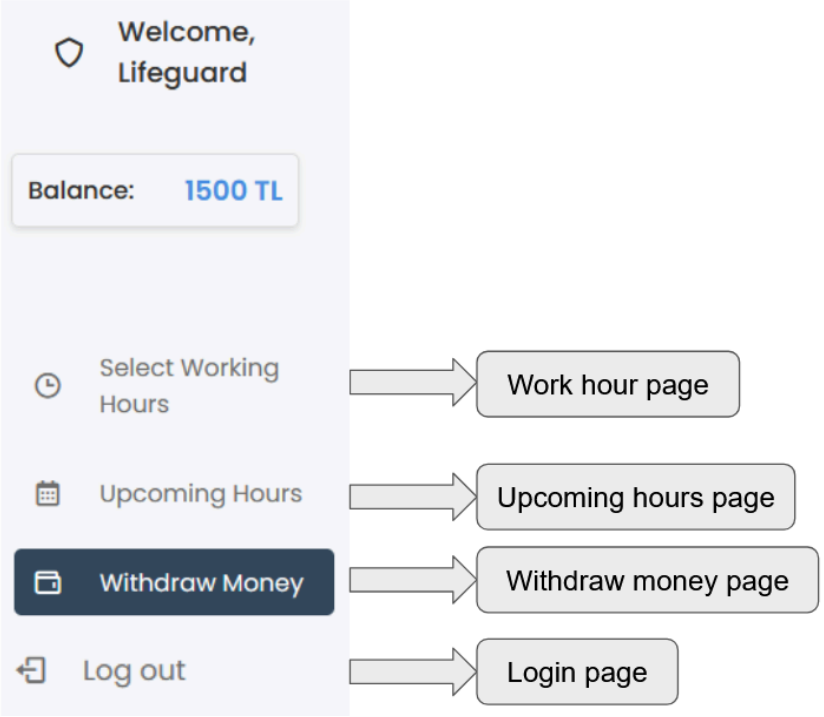
7.5 Member Sidebar



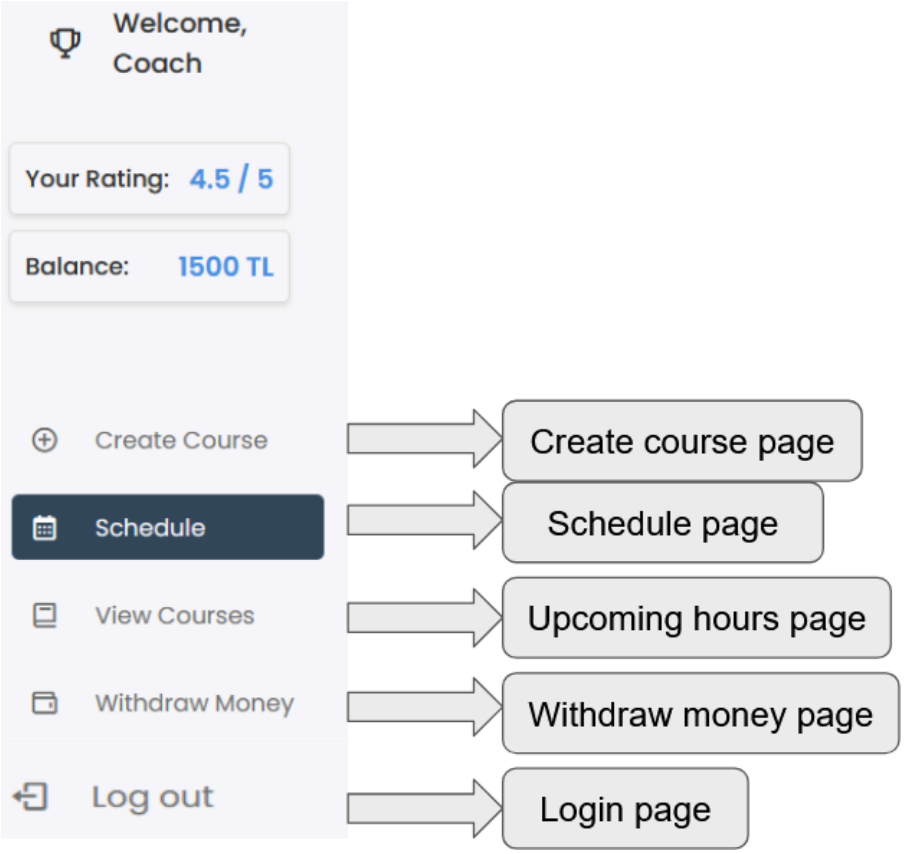
7.6 Nonmember Sidebar



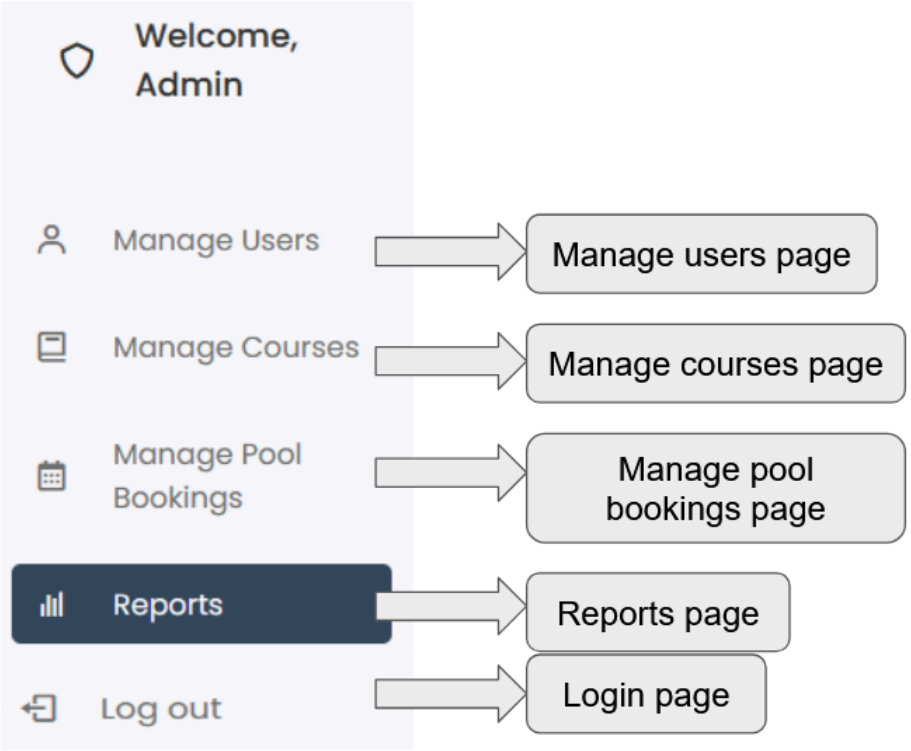
7.7 Lifeguard Sidebar



7.8 Coach Sidebar

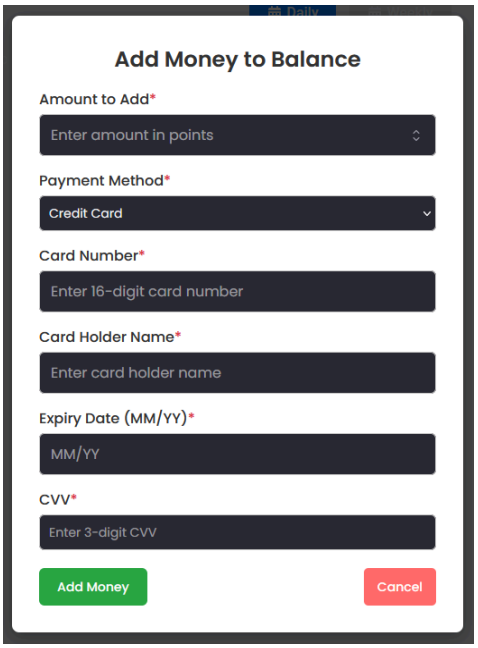


7.9 Admin Sidebar



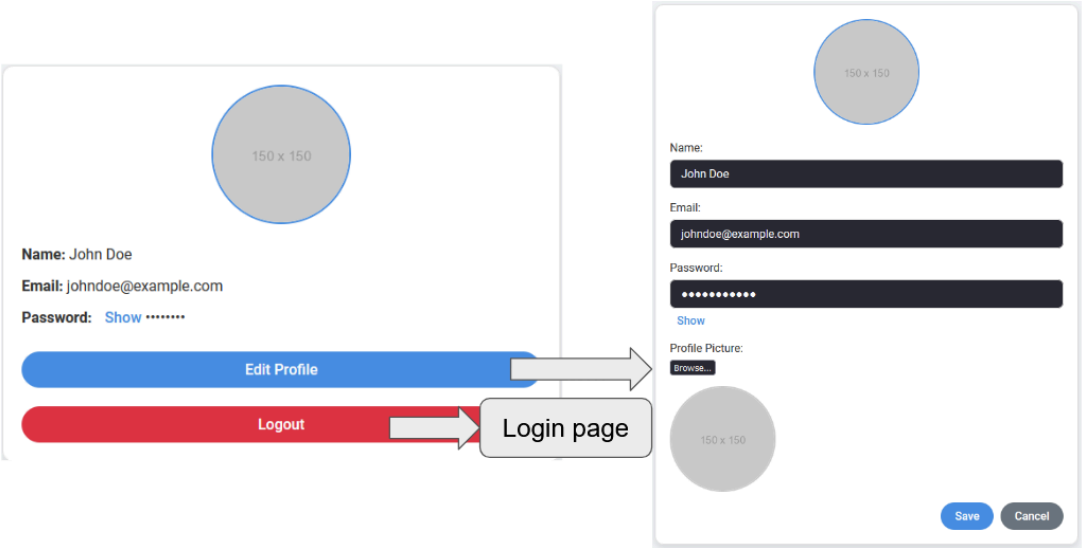
7.10 Add Balance Pop-Up

Members and nonmembers can add balance to their account after clicking the plus sign next to their balance. This will open up a popup form that when entered the correct information withdraws money from the users bank account and adds it as balance to their accoun



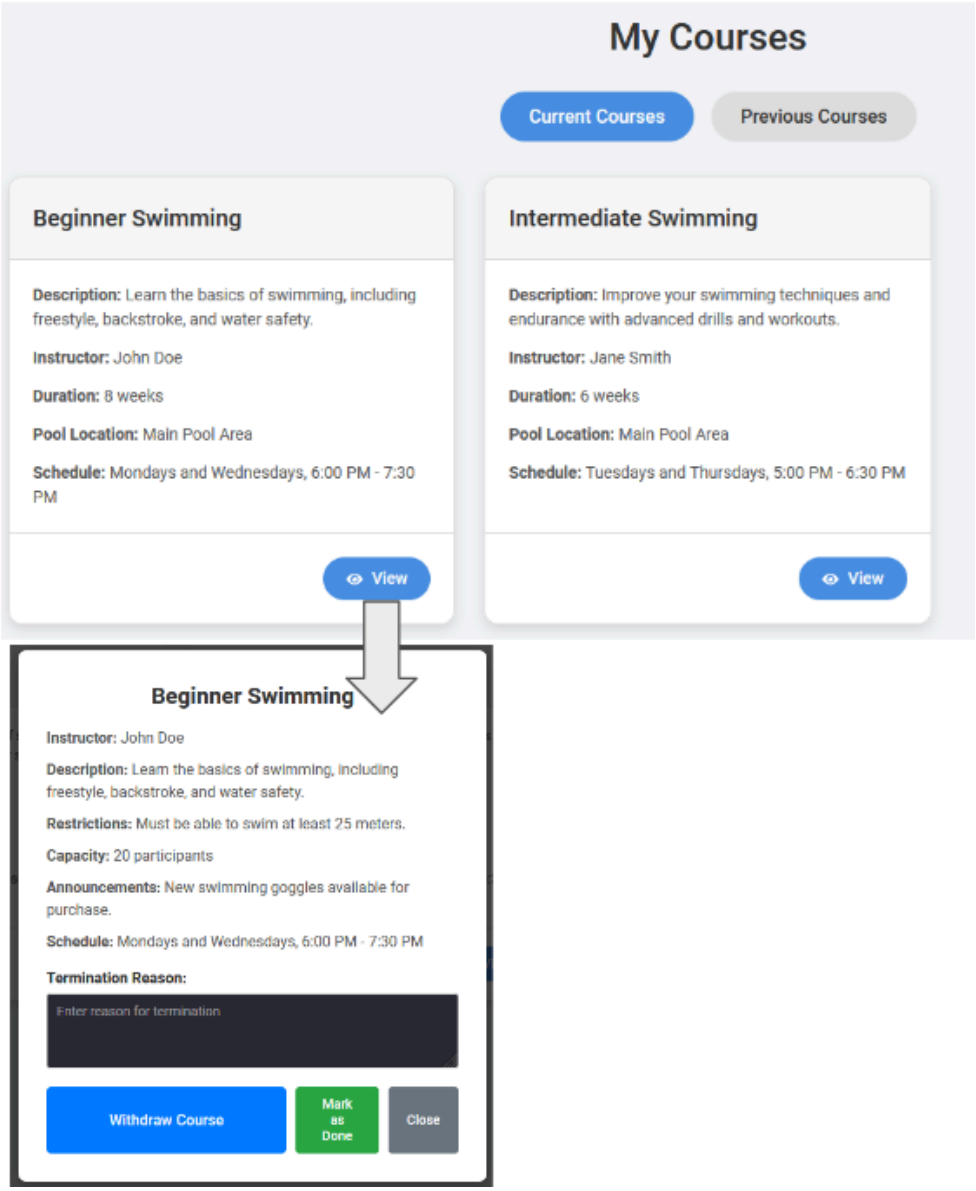
7.11 Profile Page

Users can see and update their information through the profile page. Edit profile button lets them edit their information and upload a profile picture.



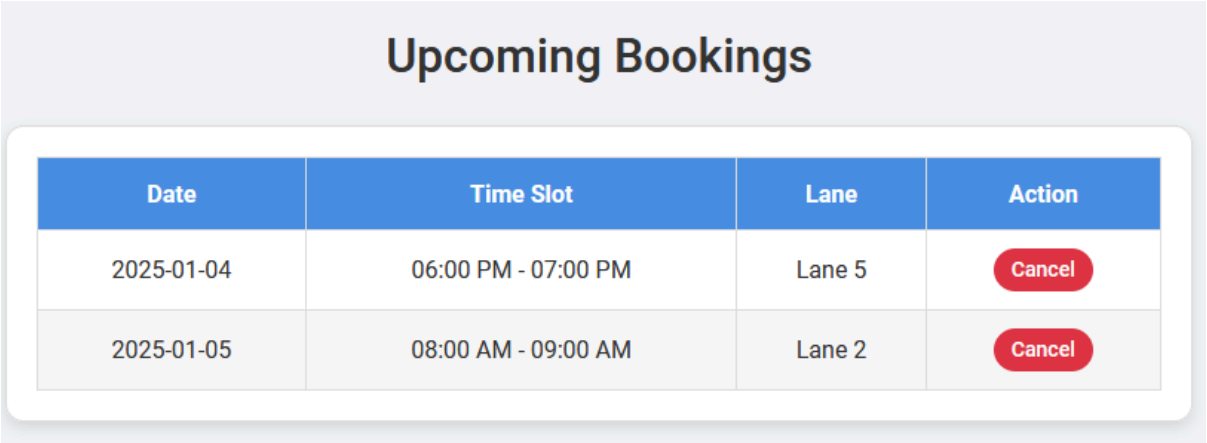
7.12 My Courses Page

Members and nonmembers can see their current and previous courses. They can withdraw from the current ones and rate the previous ones.



7.13 Upcoming Bookings Page

Members and nonmembers can see their booked lanes and cancel their bookings.

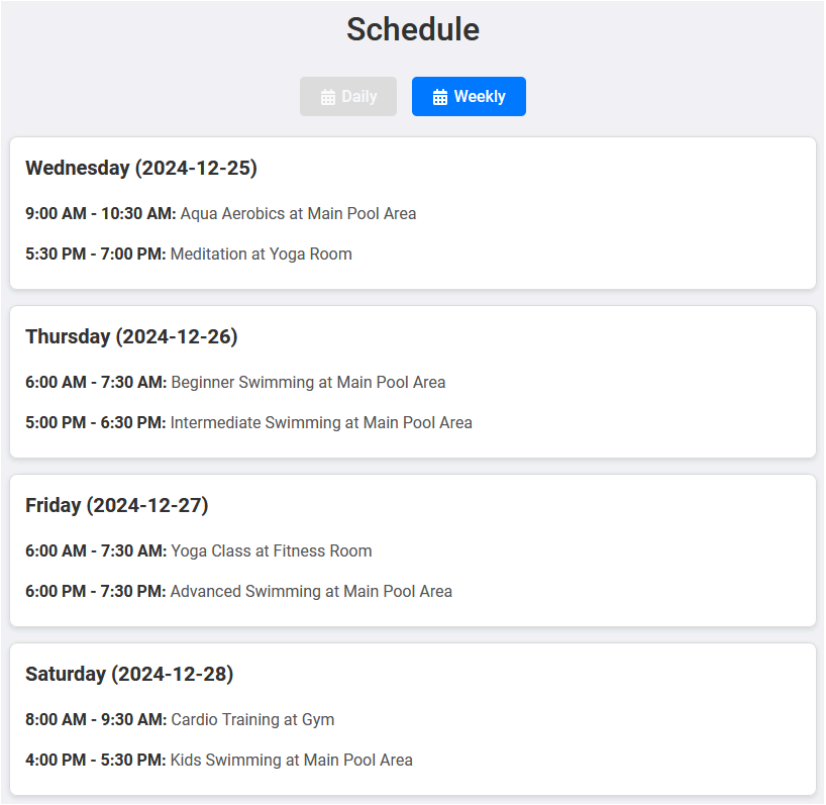


Upcoming Bookings

Date	Time Slot	Lane	Action
2025-01-04	06:00 PM - 07:00 PM	Lane 5	Cancel
2025-01-05	08:00 AM - 09:00 AM	Lane 2	Cancel

7.14 Member/Non Member Schedule Page

Members and nonmembers can see their weekly and daily schedule consisting of the courses they enrolled in.



Schedule

Daily Weekly

Wednesday (2024-12-25)

9:00 AM - 10:30 AM: Aqua Aerobics at Main Pool Area

5:30 PM - 7:00 PM: Meditation at Yoga Room

Thursday (2024-12-26)

6:00 AM - 7:30 AM: Beginner Swimming at Main Pool Area

5:00 PM - 6:30 PM: Intermediate Swimming at Main Pool Area

Friday (2024-12-27)

6:00 AM - 7:30 AM: Yoga Class at Fitness Room

6:00 PM - 7:30 PM: Advanced Swimming at Main Pool Area

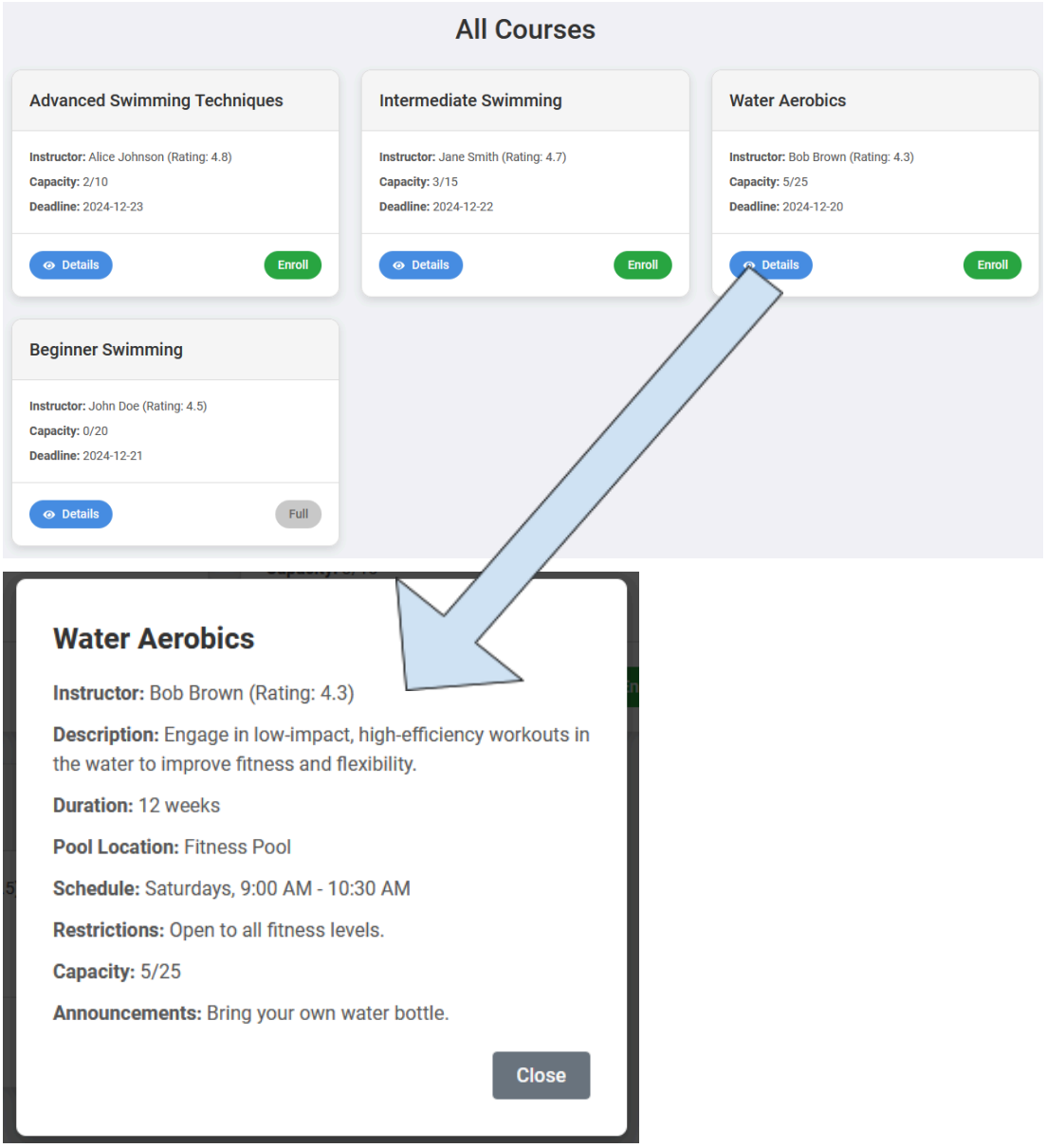
Saturday (2024-12-28)

8:00 AM - 9:30 AM: Cardio Training at Gym

4:00 PM - 5:30 PM: Kids Swimming at Main Pool Area

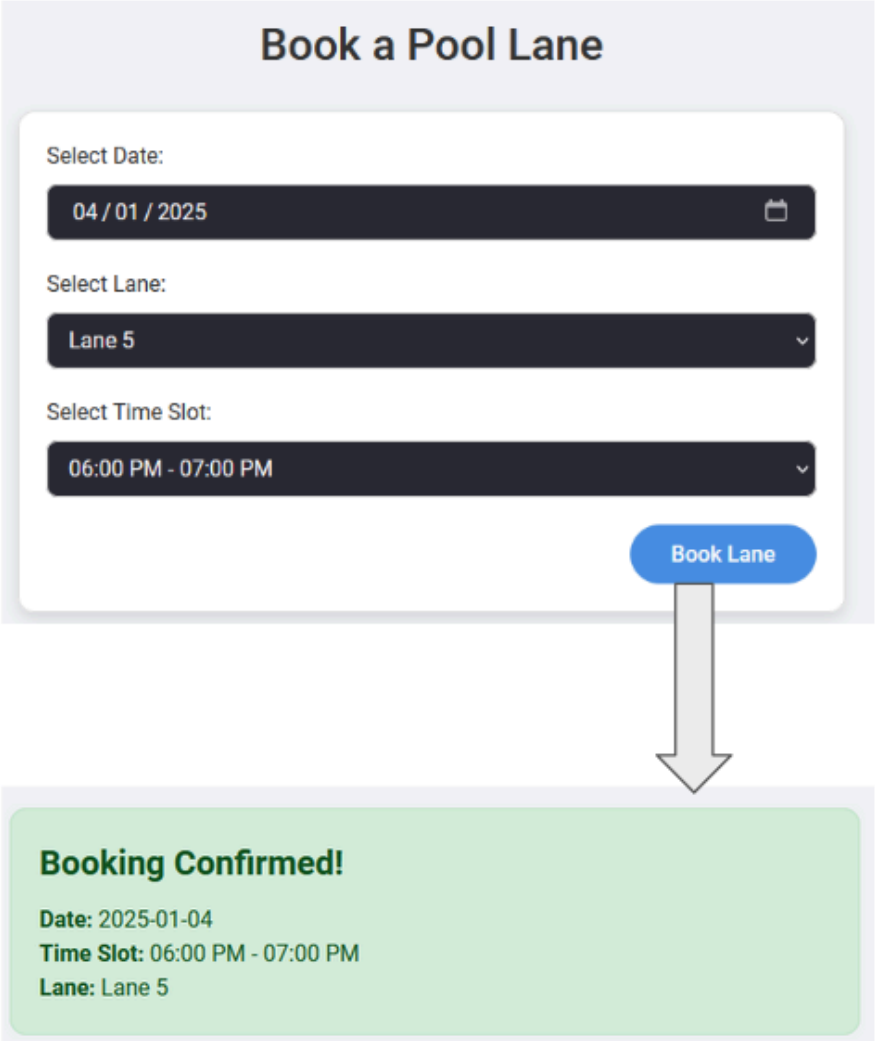
7.15 All Courses Page

Members and nonmembers can see all the courses offered by the swimming pool. They can see their full details and enroll in the course.



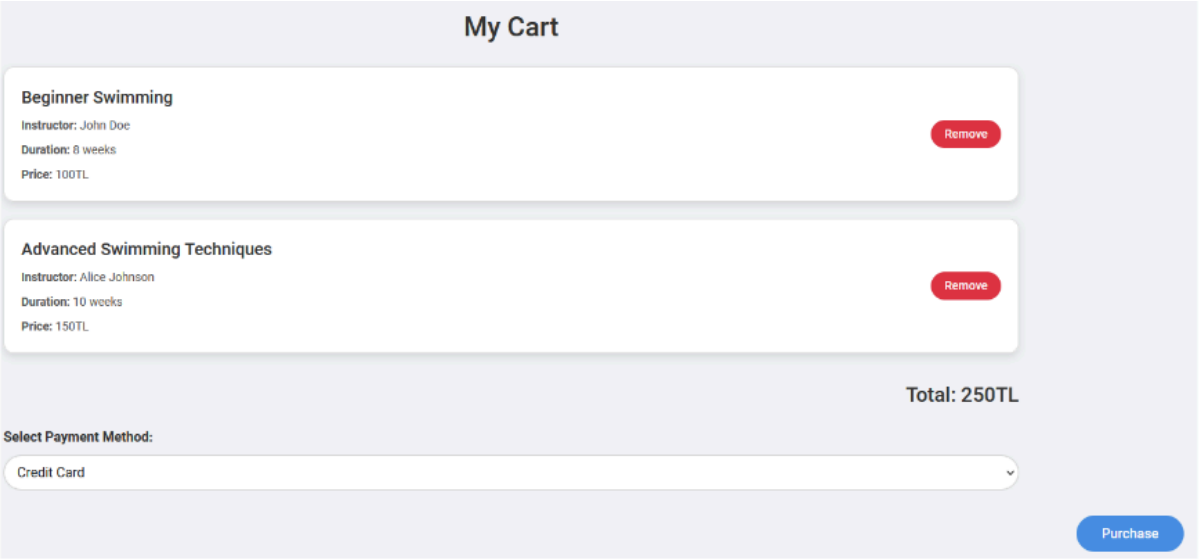
7.16 Book Pool Lane Page

Members and nonmembers can book a lane by entering the date, the lane, and the time slot they want.



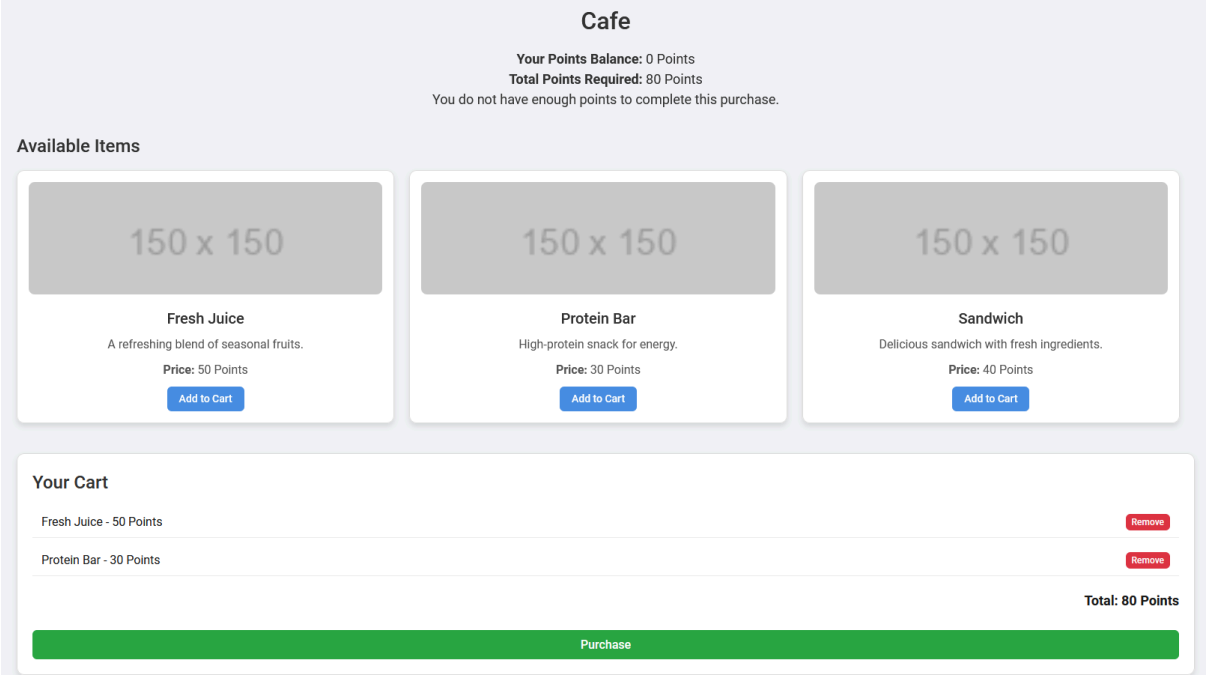
7.17 My Cart Page

Members and nonmembers can pay for the courses they enrolled in. They can decide to not take a course and remove it from their cart.



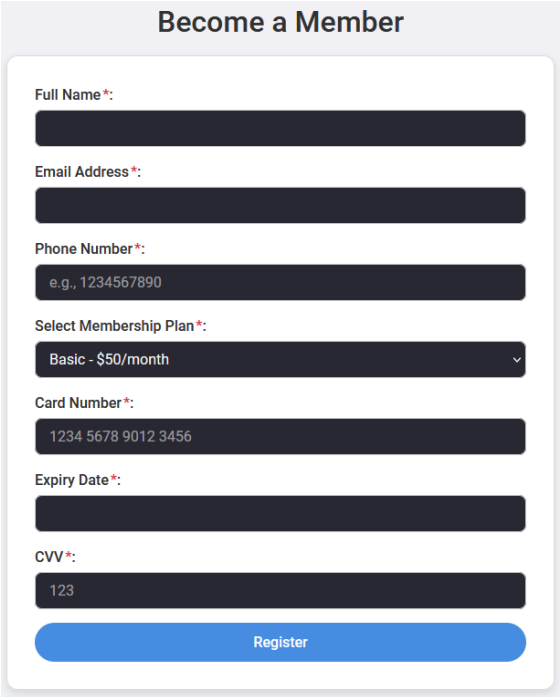
7.18 Cafe Page

Members can redeem items from the cafe using the points they earned. They can decide what to add to their cart and remove the items in their cart.



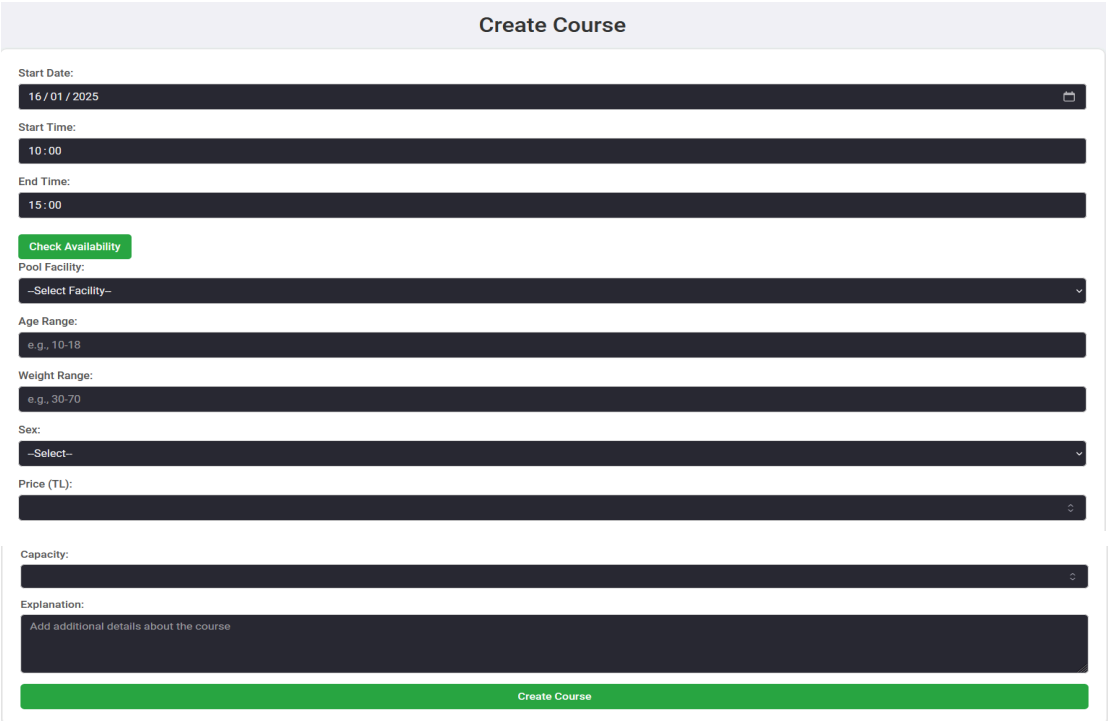
7.19 Become a Member Page

Nonmembers can become a member by subscribing to the membership plan. They can fill out the payment form, and on success, their account will be switched to a member account.



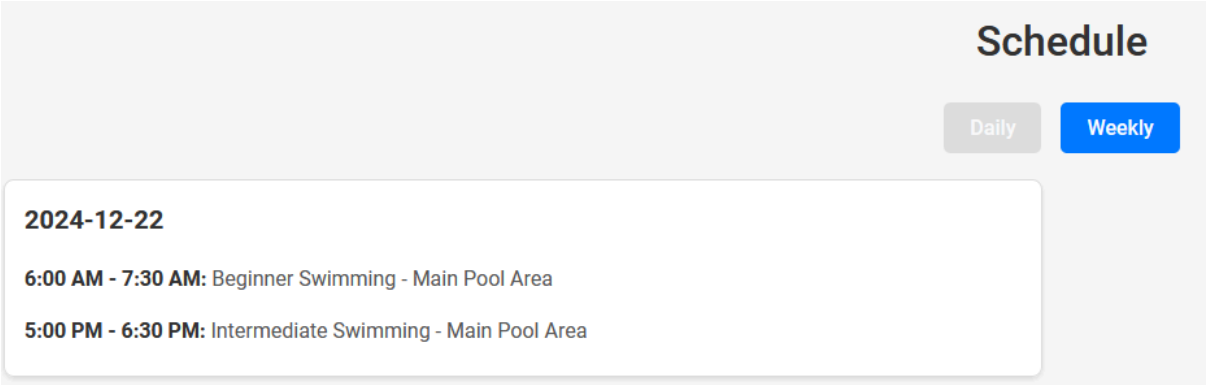
7.20 Create Course Page

Coaches can create their own courses by filling a form. The form includes information such as the course date, hour, age and weight range, gender, capacity. They can also check if the time is available by clicking the check availability button.



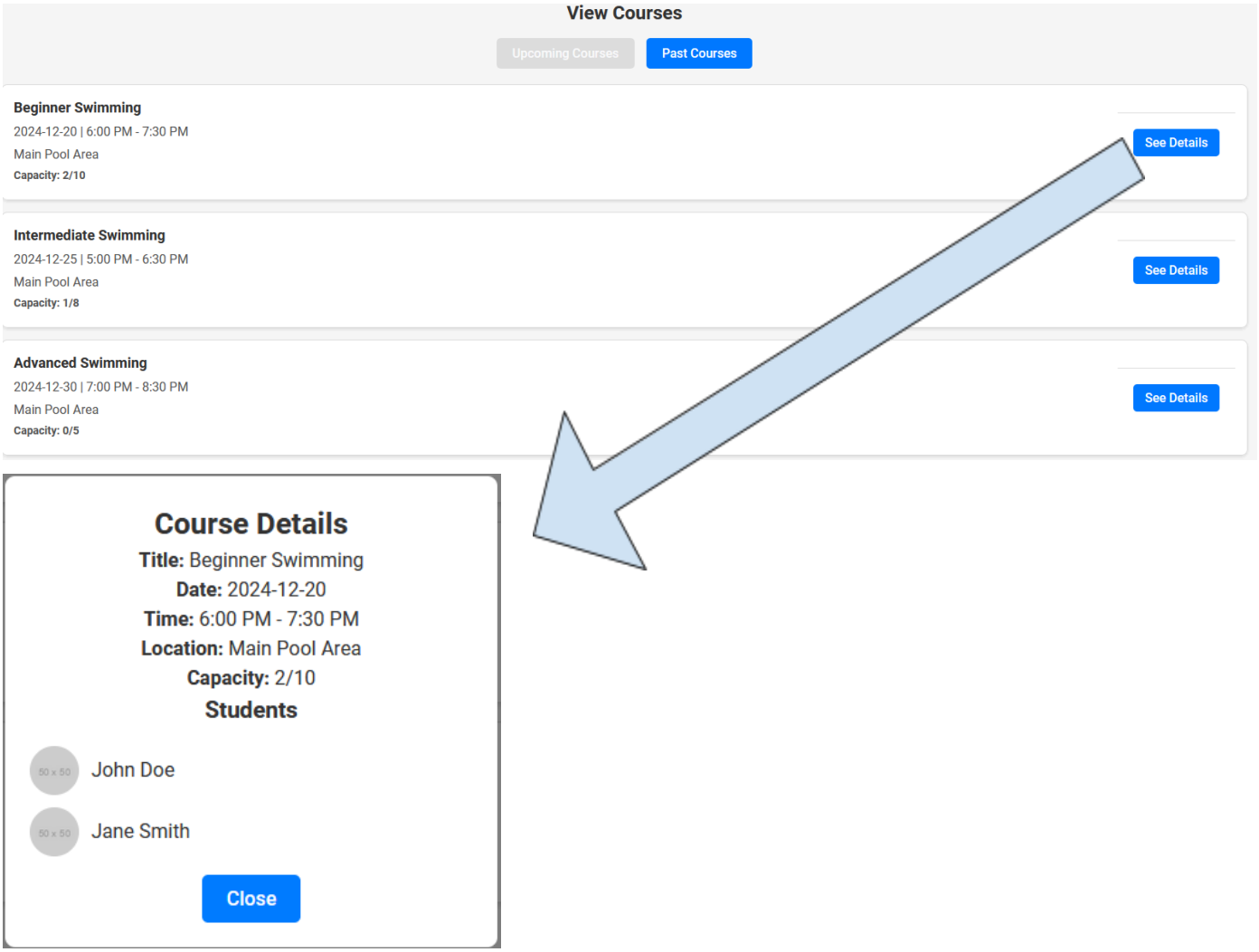
7.21 Coach Schedule Page

Coaches can see their daily and weekly schedules. The schedule includes the date, time, the course name, and the pool name.



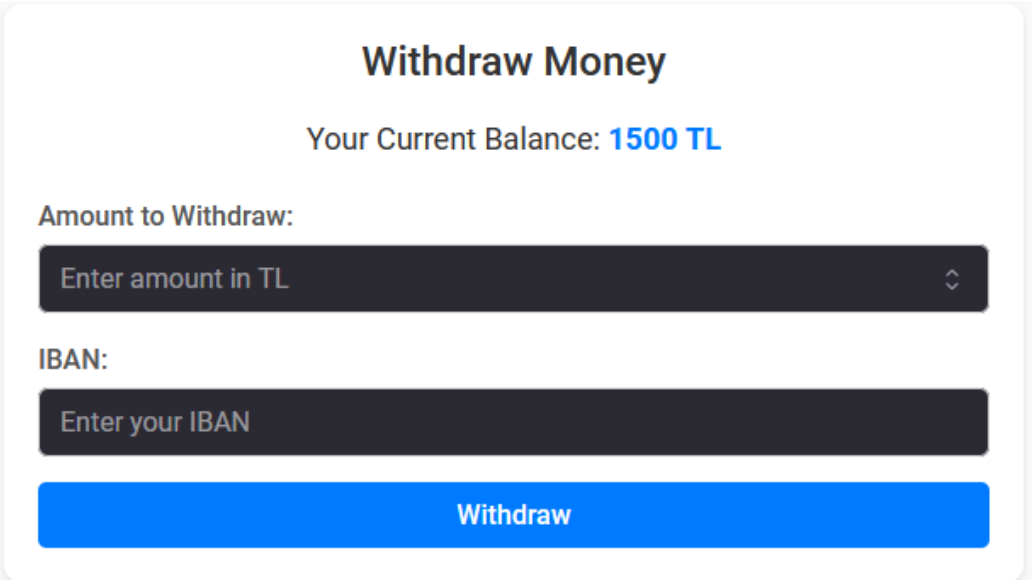
7.22 View Courses Page

Coaches can view their upcoming and past courses and check their details.



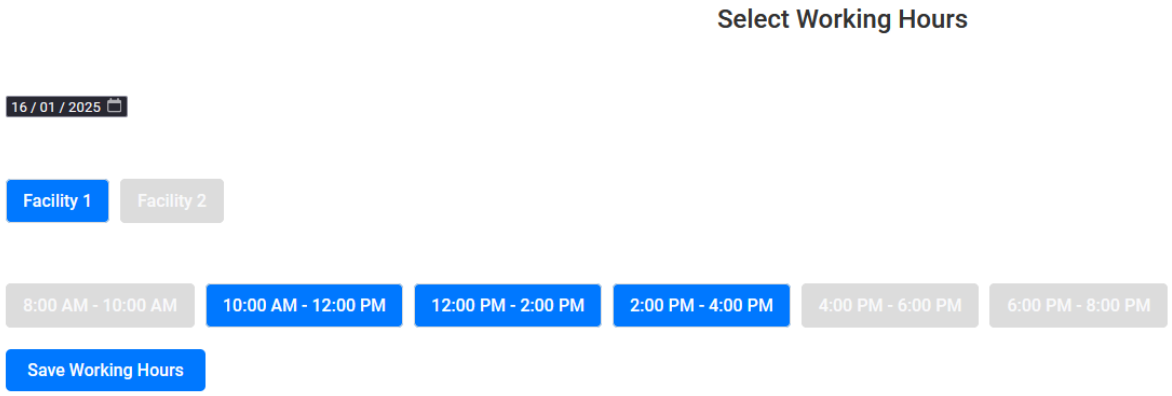
7.23 Withdraw Money Page

Coaches and lifeguards can withdraw money from their account to their bank account by entering the amount and the IBAN of their bank account.



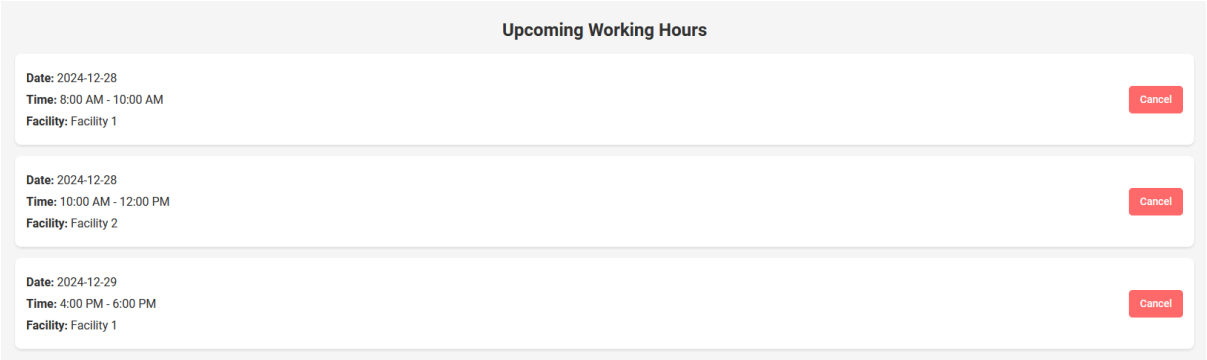
7.24 Work Hours Page

Lifeguards can enter the days they are working by selecting the time, the pool, and the hours.



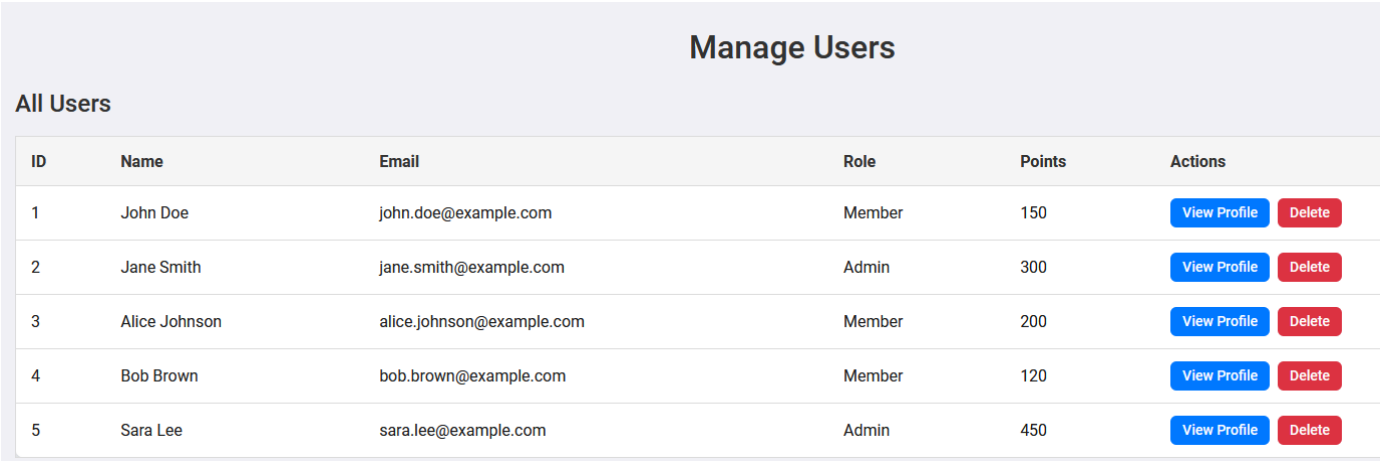
7.25 Upcoming Hours Page

Lifeguards can see and cancel the working hours they registered to the system.



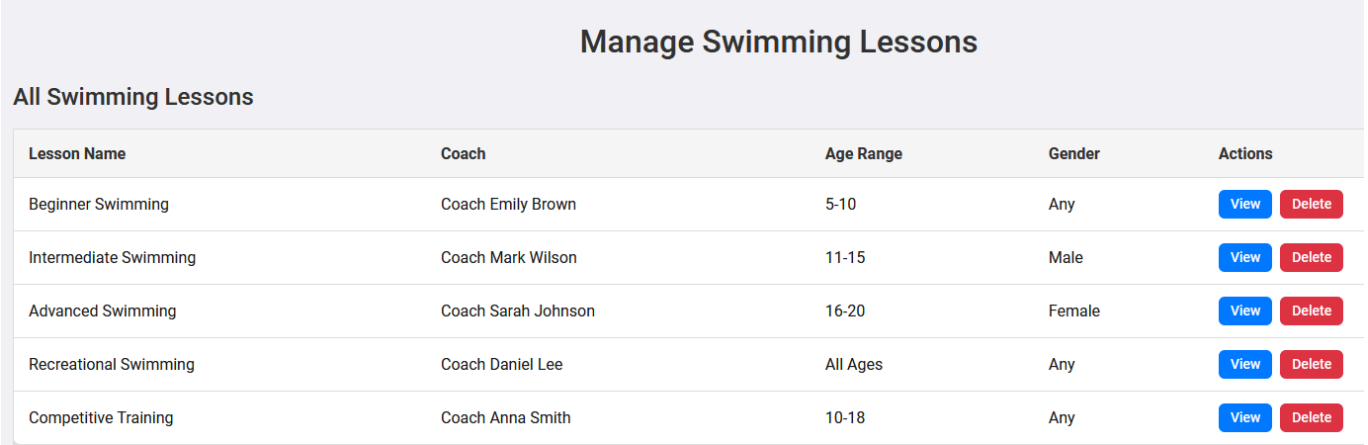
7.26 Manage Users Page

Admin can see the users registered in the system and their information. They can also delete accounts.



7.27 Manage Courses Page

Admin can see the courses opened and their information. They can also delete courses.



7.28 Manage Pool Bookings Pages

Admin can see the lane bookings and their date and location information. They can also delete bookings.

Manage Pool Bookings

All Bookings

ID	User	Date	Time	Pool	Status	Actions
1	John Doe	2024-12-30	10:00 AM - 12:00 PM	Main Pool	Confirmed	View Booking Delete
2	Jane Smith	2024-12-31	2:00 PM - 4:00 PM	Lap Pool	Pending	View Booking Delete
3	Alice Johnson	2025-01-01	8:00 AM - 10:00 AM	Kids Pool	Confirmed	View Booking Delete
4	Bob Brown	2025-01-02	6:00 PM - 8:00 PM	Main Pool	Cancelled	View Booking Delete

7.29 Reports Page

Admin can generate system reports which can include user, transaction, and course information.

Generate Report

- [x] Include Users Information
- [x] Include Transactions Information
- [x] Include Courses Information

Generate Report

Users Report

ID	Name	Email
1	Alice Johnson	alice@example.com
2	Bob Smith	bob@example.com

Transactions Report

Transaction ID	User	Amount	Date
1001	Alice Johnson	$50	2024-12-01
1002	Bob Smith	$75	2024-12-05

Swimming Courses Report

Course ID	Lesson Title	Coach	Enrollment
SWIM101	Beginner Swimming	Coach Emily Brown	50
SWIM202	Intermediate Swimming	Coach Mark Wilson	30
SWIM303	Advanced Swimming	Coach Sarah Johnson	20

8. References

[1] Canva, “Canva: Herkes için Görsel Çalışma Seti,” *Canva*. https://www.canva.com/tr_tr

[2] “Draw.io - free flowchart maker and diagrams online,” Flowchart Maker & Online Diagram Software. https://app.diagrams.net/#G19T17ddcRAOtlJUwzh8Hsv1P1V_jbrDnp#%7B%22pageId%22%3A%22R2lEEEUBdFMjLlhIrx00%22%7D