

### Link to Video:

<https://youtu.be/bp-FKXfxvAk>

### Introduction

The designed database system has been developed to take care of all operations of a health club covering the members, trainers, as well as the administrative staff as well. It adopts a relational way to store and manage data that depicts these entities and their interactions. The relational schema was utilized for schematizing the model to a database using the PostgreSQL.

### Entities and Relationships:

The database consists of the following entities and their relationships:

- **Members:** Represents individuals who have registered with the club

Column Name	Data Type	Constraints	Description
<b>member_id</b>	INT	PRIMARY KEY	Unique identifier for each member.
<b>email</b>	VARCHAR	UNIQUE	Member's email address for login.
<b>password</b>	VARCHAR		Hashed password for secure authentication.
<b>first_name</b>	VARCHAR		Member's first name.
<b>last_name</b>	VARCHAR		Member's last name.
<b>gender</b>	CHAR		Member's gender (e.g., M, F).
<b>birthdate</b>	DATE		Member's date of birth.
<b>phone_number</b>	VARCHAR		Member's phone number.
<b>address</b>	VARCHAR		Member's address.
<b>membership_type</b>	VARCHAR		Type of membership (e.g., standard, premium).
<b>profile_picture</b>	VARCHAR		Path to member's profile picture (optional).

- **Trainers:** Represents certified professionals who provide training services

Column Name	Data Type	Constraints	Description
<b>trainer_id</b>	INT	PRIMARY KEY	Unique identifier for each trainer.
<b>email</b>	VARCHAR	UNIQUE	Trainer's email address for login (optional).
<b>first_name</b>	VARCHAR		Trainer's first name.
<b>last_name</b>	VARCHAR		Trainer's last name.
<b>gender</b>	CHAR		Trainer's gender (e.g., M, F).
<b>specialization</b>	VARCHAR		Trainer's area of expertise (e.g., strength training, yoga).
<b>bio</b>	TEXT		Trainer's biography.
<b>profile_picture</b>	VARCHAR		Path to trainer's profile picture (optional).

- **Administrative Staff:** Represents personnel managing the club's operations

Column Name	Data Type	Constraints	Description
<b>staff_id</b>	INT	PRIMARY KEY	Unique identifier for each staff member.
<b>email</b>	VARCHAR	UNIQUE	Staff member's email address for login.
<b>password</b>	VARCHAR		Hashed password for secure authentication.
<b>first_name</b>	VARCHAR		Staff member's first name.
<b>last_name</b>	VARCHAR		Staff member's last name.

- **Equipment:** Represents exercise equipment available for member use ().

Column Name	Data Type	Constraints	Description
<b>equipment_id</b>	INT	PRIMARY KEY	Unique identifier for each equipment piece.
<b>name</b>	VARCHAR		Name of the equipment (e.g., treadmill, elliptical trainer).

- **Exercise Routines:** Represents personalized exercise plans for members

Column Name	Data Type	Constraints	Description
<b>routine_id</b>	INT	PRIMARY KEY	Unique identifier for each exercise routine.
<b>member_id</b>	INT	FOREIGN KEY REFERENCES members(member_id)	Member associated with the routine.
<b>exercise_name</b>	VARCHAR		Name of the exercise.
<b>sets</b>	INT		Number of sets for the exercise.
<b>reps</b>	INT		Number of repetitions for the exercise.
<b>weight</b>	DECIMAL		Weight used for the exercise
<b>day_of_week</b>	VARCHAR		Day of the week the exercise is performed.

- **Goals:** Represents personal fitness goals set by members (one-to-many with Members and optional one-to-many with Fitness Achievements).

Column Name	Data Type	Constraints	Description
<b>goal_id</b>	INT	PRIMARY KEY	Unique identifier for each goal.
<b>member_id</b>	INT	FOREIGN KEY REFERENCES members(member_id)	Member associated with the goal.
<b>goal_type</b>	VARCHAR		Type of fitness goal (e.g., weight loss, muscle gain).
<b>target_value</b>	DECIMAL		Target value for the goal.
<b>start_date</b>	DATE		Start date for achieving the goal.
<b>end_date</b>	DATE		Target end date for achieving the goal.

- **Fitness Achievements:** Represents accomplishments towards member goals (optional one-to-many with Goals and one-to-many with Members).

Column Name	Data Type	Constraints	Description
<b>achievement_id</b>	INT	PRIMARY KEY	Unique identifier for each achievement.
<b>member_id</b>	INT	FOREIGN KEY REFERENCES members(member_id)	Member associated with the achievement.
<b>achievement_date</b>	DATE		Date the achievement was accomplished.
<b>achievement_description</b>	TEXT		Description of the achievement.
<b>goal_id</b>	INT	FOREIGN KEY REFERENCES goals(goal_id)	Goal associated with the achievement.

- **Health Statistics:** Represents health data tracked for members

Column Name	Data Type	Constraints	Description
<b>statistic_id</b>	INT	PRIMARY KEY	Unique identifier for each health statistic entry.
<b>member_id</b>	INT	FOREIGN KEY REFERENCES members(member_id)	Member associated with the statistic.
<b>date</b>	DATE		Date the statistic was recorded.
<b>weight</b>	DECIMAL		Member's weight.
<b>height</b>	DECIMAL		Member's height.
<b>body_fat_percentage</b>	DECIMAL		Member's body fat percentage (optional).
<b>blood_pressure_systolic</b>	INT		Systolic blood pressure reading (optional).

<b>blood_pressure_diastolic</b>	INT		Diastolic blood pressure reading (optional).
<b>resting_heart_rate</b>	INT		Member's resting heart rate (optional).

- **Classes:** Represents group fitness classes offered by the club

Column Name	Data Type	Constraints	Description
<b>class_id</b>	SERIAL	PRIMARY KEY	Unique identifier for each class.
<b>class_name</b>	VARCHAR		Name of the class.
<b>description</b>	TEXT		Description of the class.
<b>trainer_id</b>	INTEGER		ID of the trainer leading the class.
<b>class_day</b>	VARCHAR		Day of the week the class takes place.
<b>class_time</b>	TIME		Time the class starts.
<b>duration_min</b>	INTEGER		Duration of the class in minutes.
<b>max_capacity</b>	INTEGER		Maximum capacity of the class.

- **Room Bookings:** Represents reservations for group fitness classes

Column Name	Data Type	Constraints	Description
<b>booking_id</b>	INT	PRIMARY KEY	Unique identifier for each room booking.
<b>class_id</b>	INT	FOREIGN KEY REFERENCES classes(class_id)	Class associated with the booking.
<b>room</b>	VARCHAR		Room where the class takes place (e.g., Studio 1, Studio 2).
<b>status</b>	VARCHAR		Status of the booking (e.g., confirmed, cancelled, pending).
<b>booking_date</b>	DATE		Date of the booking.
<b>from_time</b>	TIME		Starting time of the booking.
<b>to_time</b>	TIME		Ending time of the booking.

- **Payments:** Represents financial transactions made by members

Column Name	Data Type	Constraints	Description
<b>payment_id</b>	INT	PRIMARY KEY	Unique identifier for each payment.
<b>member_id</b>	INT	FOREIGN KEY REFERENCES members(member_id)	Member who made the payment.
<b>payment_date</b>	DATE		Date the payment was made.
<b>amount</b>	DECIMAL		Amount paid.
<b>payment_method</b>	VARCHAR		Method of payment (e.g., credit card, cash).
<b>description</b>	TEXT		Description of the payment (e.g., membership fee, personal training session).

### **Cardinalities and Participation Types:**

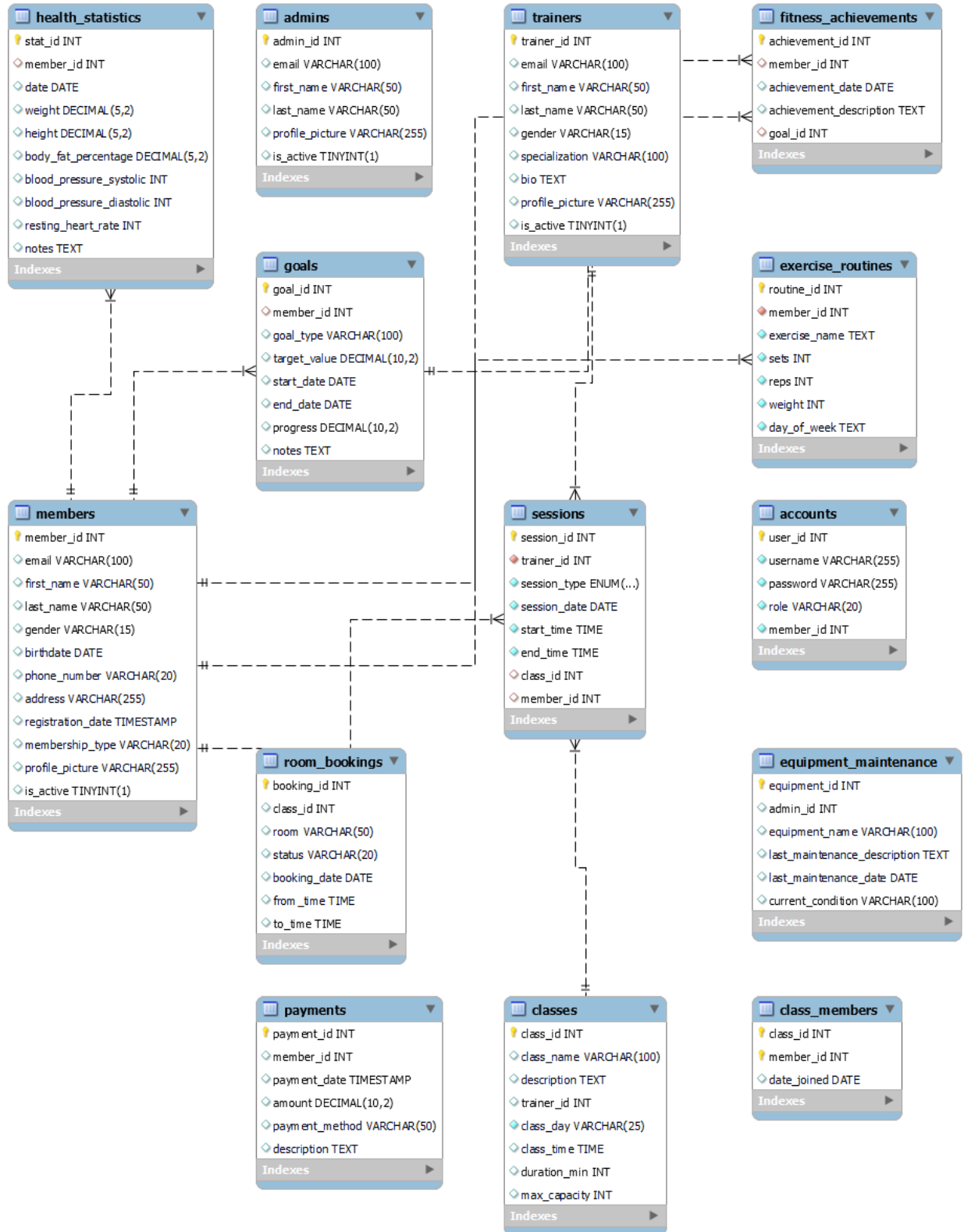
The cardinalities (number of occurrences) and participation types (mandatory or optional) for the relationships are based on the problem statement and typical fitness club operations:

- **Members:**
  - Can have many Exercise Routines. (One member can have multiple routines)
  - Can have many Goals. (One member can set multiple goals)
  - Can have many Fitness Achievements. (One member can achieve multiple goals)
  - Can have many Health Statistics entries. (Health data is tracked over time)
  - Can make many Payments. (Members pay fees and for services)
- **Trainers:**
  - Can provide training to many Members (many-to-many relationship modeled through a separate table for Personal Training Sessions)
- **Administrative Staff:**
  - Can create many Room Bookings. (Staff manages reservations for classes)
- **Equipment:** (Independent entity, not directly related to other entities)
- **Exercise Routines:**
  - Belong to one Member. (A routine is specific to a member's plan)
- **Goals:**
  - Set by one Member. (A goal belongs to a specific member)
  - May be linked to zero or one Fitness Achievement. (A goal may or may not have a corresponding achievement)
- **Fitness Achievements:**
  - Achieved by one Member. (An achievement belongs to a specific member)

- May be linked to zero or one Goal. (An achievement may or may not be related to a specific goal)
- **Health Statistics:**
  - Recorded for one Member. (Health data belongs to a specific member)
- **Payments:**
  - Made by one Member. (A payment is made by a specific member)
- **Classes:** (Not explicitly modeled, but assumed to be offered by the club)
  - Can have many Room Bookings. (A class can have multiple bookings)
- **Room Bookings:**
  - Made for one Class. (A booking is for a specific class)
  - Created by one Administrative Staff member. (Staff manages bookings)



## ER Diagram



## Relational Schema

