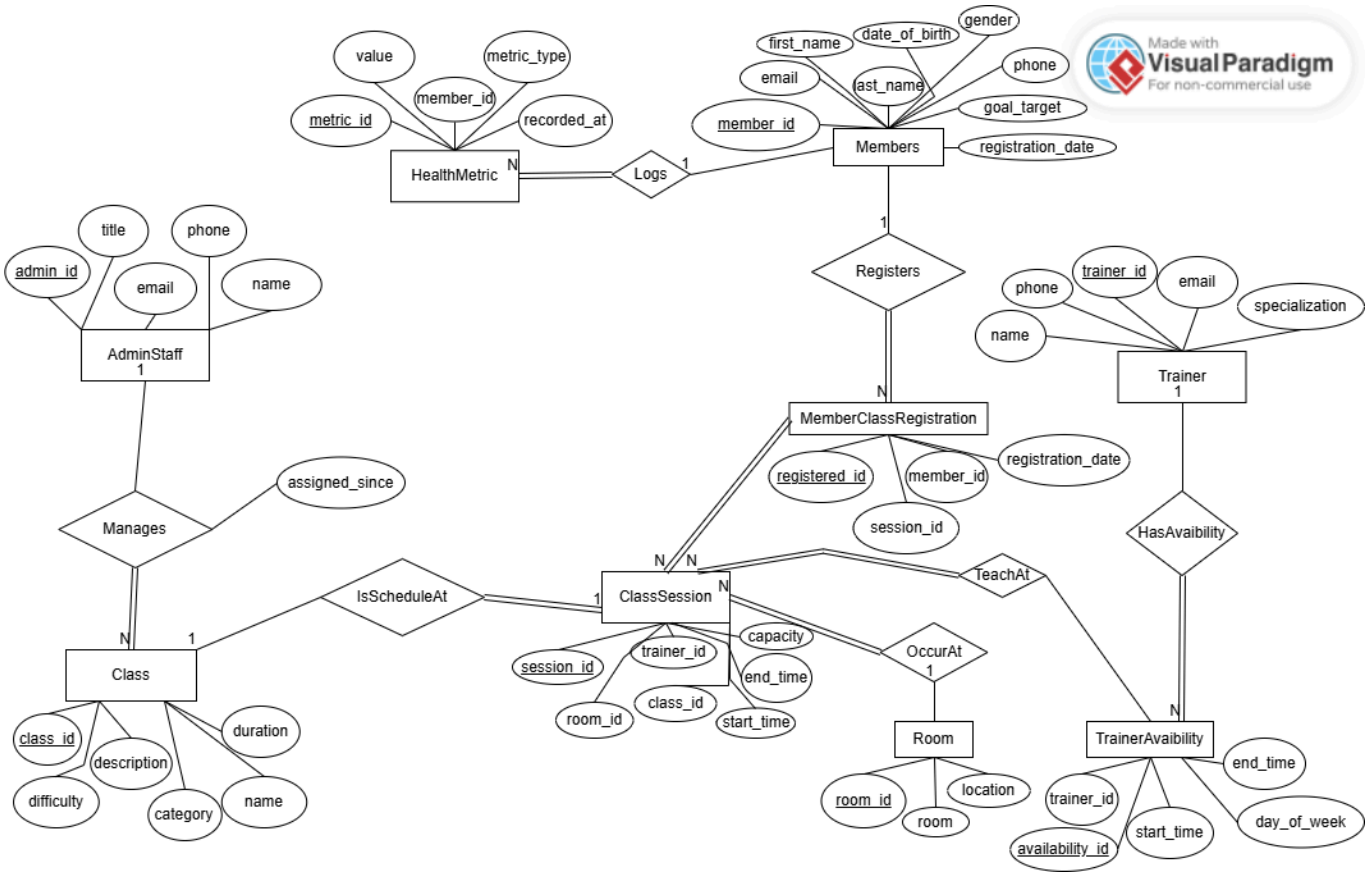
Part 1 : ER Diagram



Part 2: Relational Mapping

Core Entities:

Members(

member_id PK,

first_name,

last_name,

date_of_birth,

gender,

email Unique,

phone,

goal_target)

HealthMetric(

metric_id PK,

member_id FK → Members(member_id),

metric_type,

value,

recorded_at)

Trainer(

trainer_id PK,

name,

email,

phone,

specialization)

TrainerAvailability(

availability_id PK,

trainer_id FK → Trainer(trainer_id),

day_of_week,

start_time,

end_time)

AdminStaff(

admin_id PK,

name,

email,

phone,

title)

Class Management:

Class(

class_id PK,

admin_id FK → AdminStaff(admin_id),

name, description,

category,

difficulty,

duration,

assigned_since)

Room(

room_id PK,

room,

location)

ClassSession(

session_id PK,

class_id FK → Class(class_id),

trainer_id FK → Trainer(trainer_id),

room_id FK → Room(room_id),

start_time,

end_time,

capacity)

MemberClassRegistration(

registered_id PK,

member_id FK → Members(member_id),

session_id FK → ClassSession(session_id),

registration_date)

<u>Part 3:</u> Normalization (Up to 3NF)

Members(member_id, first_name, last_name, date_of_birth, gender, email Unique, phone, goal_target, registration_date)

PK: member_id

All other attributes describe a single member.
No non-key attribute determines another non-key attribute.

Therefore, Members are in 3NF.

HealthMetric(metric_id, member_id, metric_type, value, recorded_at)

PK: metric_id
FK: member_id → Members(member_id)

metric_type, value, and recorded_at all describe one specific metric entry identified by metric_id.
No transitive or partial dependencies.

Therefore, HealthMetric is in 3NF.

Trainer(trainer_id, name, email, phone, specialization)

PK: trainer_id

All non-key attributes describe one trainer.
No non-key attribute functionally determines another non-key attribute.

Therefore, Trainer is in 3NF.

TrainerAvailability(availability_id, trainer_id, day_of_week, start_time, end_time)

PK: availability_id
FK: trainer_id → Trainer(trainer_id)

day_of_week, start_time, and end_time describe one availability slot.
No transitive dependencies.

Therefore, TrainerAvailability is in 3NF.

AdminStaff(admin_id, name, email, phone, title)

PK: admin_id

All non-key attributes describe an admin staff member.
No non-key attribute determines another non-key attribute.

Therefore, AdminStaff is in 3NF.

Class(class_id, admin_id, name, description, category, difficulty, duration, assigned_since)

PK: class_id
FK: admin_id → AdminStaff(admin_id)

name, description, category, difficulty, duration, and assigned_since describe a class and its management assignment.
No non-key attribute determines another non-key attribute.

Therefore, Class is in 3NF.

Room(room_id, room, location)

PK: room_id

room (name/code) and location both depend only on room_id.
No further dependencies between non-key attributes.

Therefore, Room is in 3NF.

ClassSession(session_id, class_id, trainer_id, room_id, start_time, end_time, capacity)

PK: session_id
FKs: class_id → Class(class_id), trainer_id → Trainer(trainer_id), room_id → Room(room_id)

start_time, end_time, and capacity describe the specific session.
All non-key attributes depend only on session_id; there are no transitive dependencies.

Therefore, ClassSession is in 3NF.

MemberClassRegistration(registered_id, member_id, session_id, registration_date)

PK: registered_id
FKs: member_id → Members(member_id), session_id → ClassSession(session_id)

registration_date depends on the specific registration identified by registered_id. No non-key attribute determines another non-key attribute.

Therefore, MemberClassRegistration is in 3NF.