Title: Health and Fitness Club Management System

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Course COMP3005 B “Database Management Systems”

Professor: Abdelghny Orogat

This file contains:

Normalization

ER diagram

Mapping

Members FDs:

MemberID -> FullName, Email, Phone, Gender, DOB, EmergencyContact

MemberID -> GoalType, TargetValue

(MemberID, RecordedAt) -> Weight, HeartRate

Admin:

AdminID -> FullName, Email, Phone

Classes:

ClassID -> ClassName, Difficulty, Description

Sessions:

SessionID -> MemberID, AdminID, ClassID, SessionDate, Duration

ClassSchedule:

ScheduleID -> ClassID, DayOfWeek, StartTime, EndTime

Payments:

PaymentID -> MemberID, Amount, PaymentDate, Method

Unnormalized:

Members(MemberID, FullName, Email, Phone, Gender, DOB, EmergencyContact, GoalType, TargetValue, RecordedAt, Weight, HeartRate)

1NF Relations:

Members:

Members(MemberID, FullName, Email, Phone, Gender, DOB, EmergencyContact)

MemberGoals(MemberID, GoalType, TargetValue)

HealthMetrics(MemberID, RecordedAt, Weight, HeartRate)

We can see that each member has a unique detail which is in FD1. And each member have fitness goals which is in FD3. And the health metrics are recorded more than once which is in FD3

2NF Relations:

Members:

in HealthMetrics (MemberID, RecordedAt) is the composite key

MemberID -> GoalType, TargetValue

(MemberID, RecordedAt) -> Weight, HeartRate

Admin: All attributes depend on AdminID

Classes: All attributes depend directly on ClassID.

ClassSchedule All attributes depend on ScheduleID

Sessions: All attributes depend on SessionID

Payments: All attributes depend on PaymentID.

3NF Relations:

all are in 3NF now

to summarize:
FDs:

MemberID -> Member attributes (FullName, Email, Phone, Gender, DOB, EmergencyContact)

MemberID -> GoalType, TargetValue

(MemberID, RecordedAt) -> Weight, HeartRate

UNF:

UNF_Members(MemberID, FullName, Email, Phone, Gender, DOB, EmergencyContact, GoalType, TargetValue, RecordedAt, Weight, HeartRate)

1NF:

We will decompose UNF -> Members, MemberGoals, HealthMetrics

Members(MemberID, FullName, Email, Phone, Gender, DOB, EmergencyContact)

MemberGoals(MemberID, GoalType, TargetValue, start_date, target_date)

HealthMetrics(MemberID, RecordedAt, Weight, HeartRate)

2NF:

We will see the composite key in HealthMetrics: (MemberID, RecordedAt)

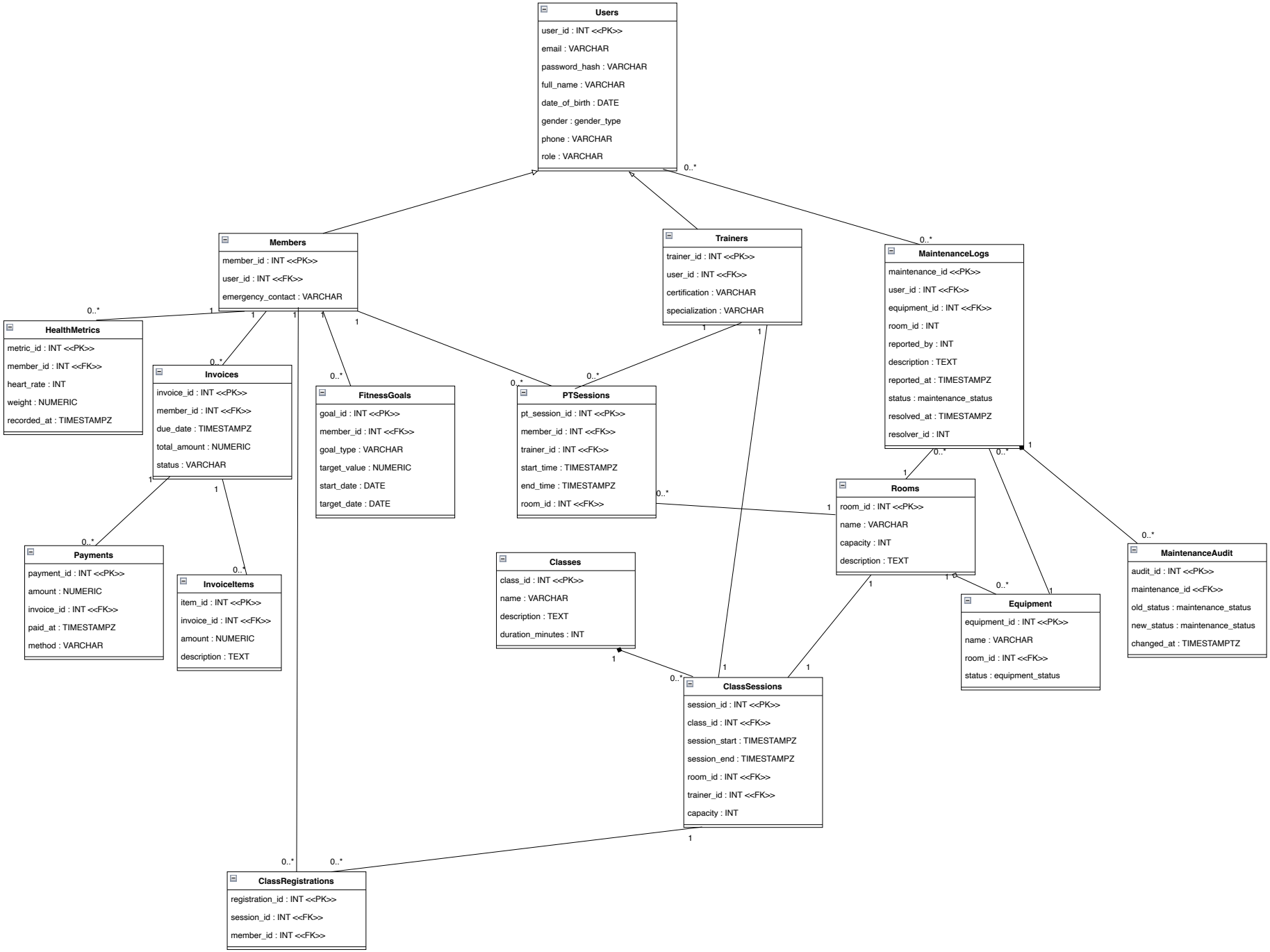
Weight, HeartRate, here they depend on the whole composite key

Now all of them satisfy 2NF.

3NF:

No non key attribute determines another non key attribute in Members, MemberGoals, HealthMetrics.

All of them are in 3NF now.


Users
user_id : INT <<PK>>
email : VARCHAR
password_hash : VARCHAR
full_name : VARCHAR
date_of_birth : DATE
gender : gender_type
phone : VARCHAR
role : VARCHAR
Members
member_id : INT <<PK>>
user_id : INT <<FK>>
emergency_contact : VARCHAR
Trainers
trainer_id : INT <<PK>>
user_id : INT <<FK>>
certification : VARCHAR
specialization : VARCHAR
MaintenanceLogs
maintenance_id <<PK>>
user_id : INT <<FK>>
equipment_id : INT <<FK>>
room_id : INT
reported_by : INT
description : TEXT
reported_at : TIMESTAMPZ
status : maintenance_status
resolved_at : TIMESTAMPZ
resolver_id : INT
HealthMetrics
metric_id : INT <<PK>>
member_id : INT <<FK>>
heart_rate : INT
weight : NUMERIC
recorded_at : TIMESTAMPZ
Invoices
invoice_id : INT <<PK>>
member_id : INT <<FK>>
due_date : TIMESTAMPZ
total_amount : NUMERIC
status : VARCHAR
FitnessGoals
goal_id : INT <<PK>>
member_id : INT <<FK>>
goal_type : VARCHAR
target_value : NUMERIC
start_date : DATE
target_date : DATE
PTSessions
pt_session_id : INT <<PK>>
member_id : INT <<FK>>
trainer_id : INT <<FK>>
start_time : TIMESTAMPZ
end_time : TIMESTAMPZ
room_id : INT <<FK>>
Rooms
room_id : INT <<PK>>
name : VARCHAR
capacity : INT
description : TEXT
MaintenanceAudit
audit_id : INT <<PK>>
maintenance_id <<FK>>
old_status : maintenance_status
new_status : maintenance_status
changed_at : TIMESTAMPTZ
Payments
payment_id : INT <<PK>>
amount : NUMERIC
invoice_id : INT <<FK>>
paid_at : TIMESTAMPZ
method : VARCHAR
InvoiceItems
item_id : INT <<PK>>
invoice_id : INT <<FK>>
amount : NUMERIC
description : TEXT
Classes
class_id : INT <<PK>>
name : VARCHAR
description : TEXT
duration_minutes : INT
Equipment
equipment_id : INT <<PK>>
name : VARCHAR
room_id : INT <<FK>>
status : equipment_status
ClassSessions
session_id : INT <<PK>>
class_id : INT <<FK>>
session_start : TIMESTAMPZ
session_end : TIMESTAMPZ
room_id : INT <<FK>>
trainer_id : INT <<FK>>
capacity : INT
ClassRegistrations
registration_id : INT <<PK>>
session_id : INT <<FK>>
member_id : INT <<FK>>

Mapping:

Users(user_id PK, email UNIQUE, password_hash, full_name, date_of_birth, gender, phone, role, created_at, updated_at)

Members(member_id PK/FK -> Users.user_id, emergency_contact)

Trainers(trainer_id PK/FK -> Users.user_id, certification, specialization)

Rooms(room_id PK, name, capacity, description)

Equipment(equipment_id PK, name, room_id FK -> Rooms.room_id, status)

Maintenance_logs(maintenance_id PK, equipment_id FK, room_id FK, reported_by FK -> Users.user_id, description, reported_at, status, resolved_at, resolver_id FK -> Users.user_id)

Maintenance_audit(audit_id PK, maintenance_id FK, old_status, new_status, changed_at, changed_by FK -> Users.user_id)

Fitness_goals(goal_id PK, member_id FK, goal_type, target_value, start_date, target_date, UNIQUE(member_id, goal_type))

Health_metrics(metric_id PK, member_id FK, weight, heart_rate, recorded_at)

Classes(class_id PK, name, description, duration_minutes)

Class_sessions(session_id PK, class_id FK, session_start, session_end, room_id FK, trainer_id FK, capacity)

Class_registrations(registration_id PK, session_id FK, member_id FK, UNIQUE(session_id, member_id))

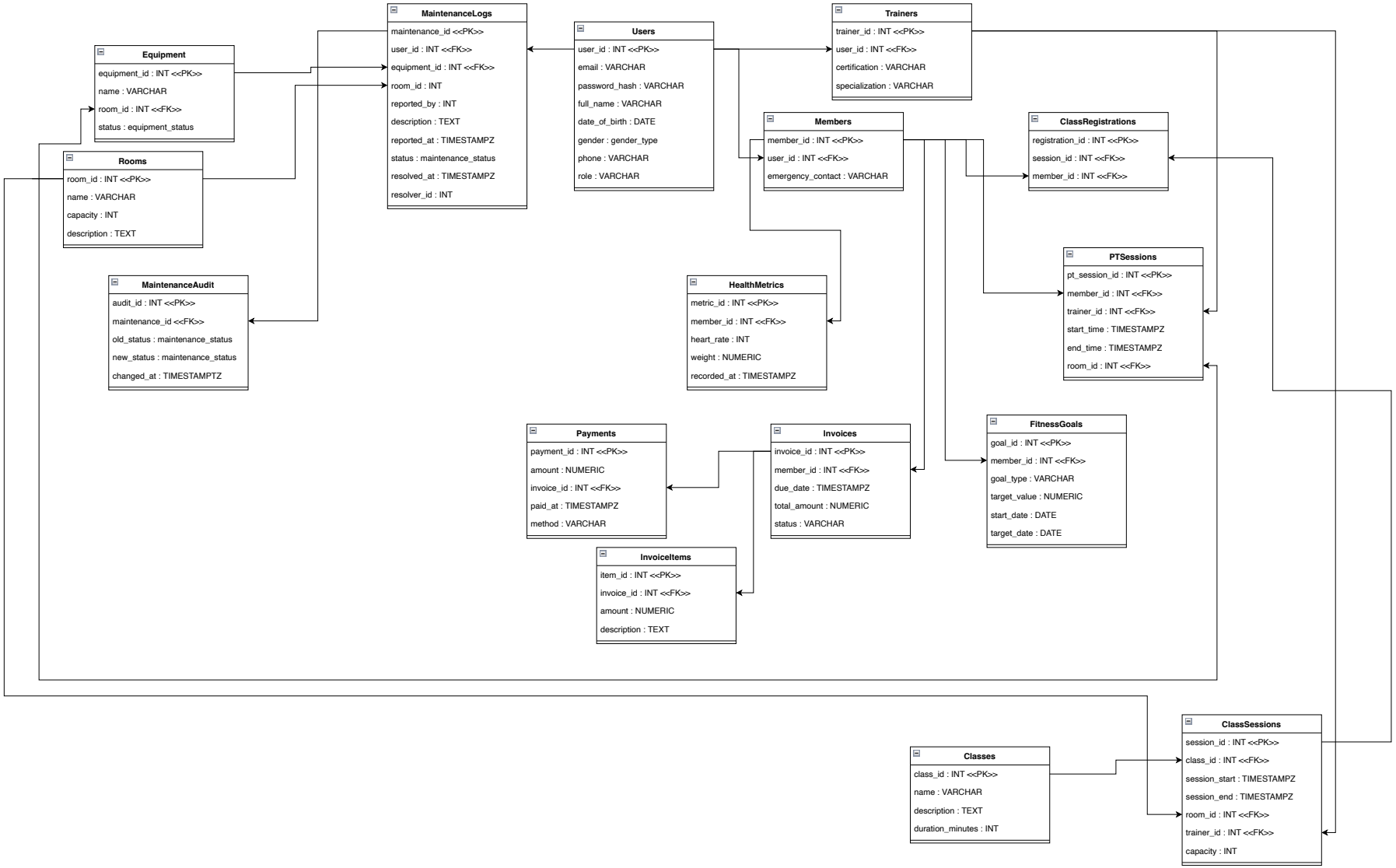
Pt_sessions(pt_session_id PK, member_id FK, trainer_id FK, start_time, end_time, room_id FK)

Trainer_availability(availability_id PK, trainer_id FK, available_start, available_end)

Invoices(invoice_id PK, member_id FK, due_date, total_amount, status)

Invoice_items(item_id PK, invoice_id FK, description, amount)

Payments(payment_id PK, invoice_id FK, paid_at, amount, method)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reported_at : TIMESTAMPZ
status : maintenance_status
resolved_at : TIMESTAMPZ
resolver_id : INT
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method : VARCHAR
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total_amount : NUMERIC
status : VARCHAR
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goal_type : VARCHAR
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target_date : DATE
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session_end : TIMESTAMPZ
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trainer_id : INT <<FK>>
capacity : INT