Project Report: Health and Fitness Club Management System

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COMP3005 A: Database Management Systems

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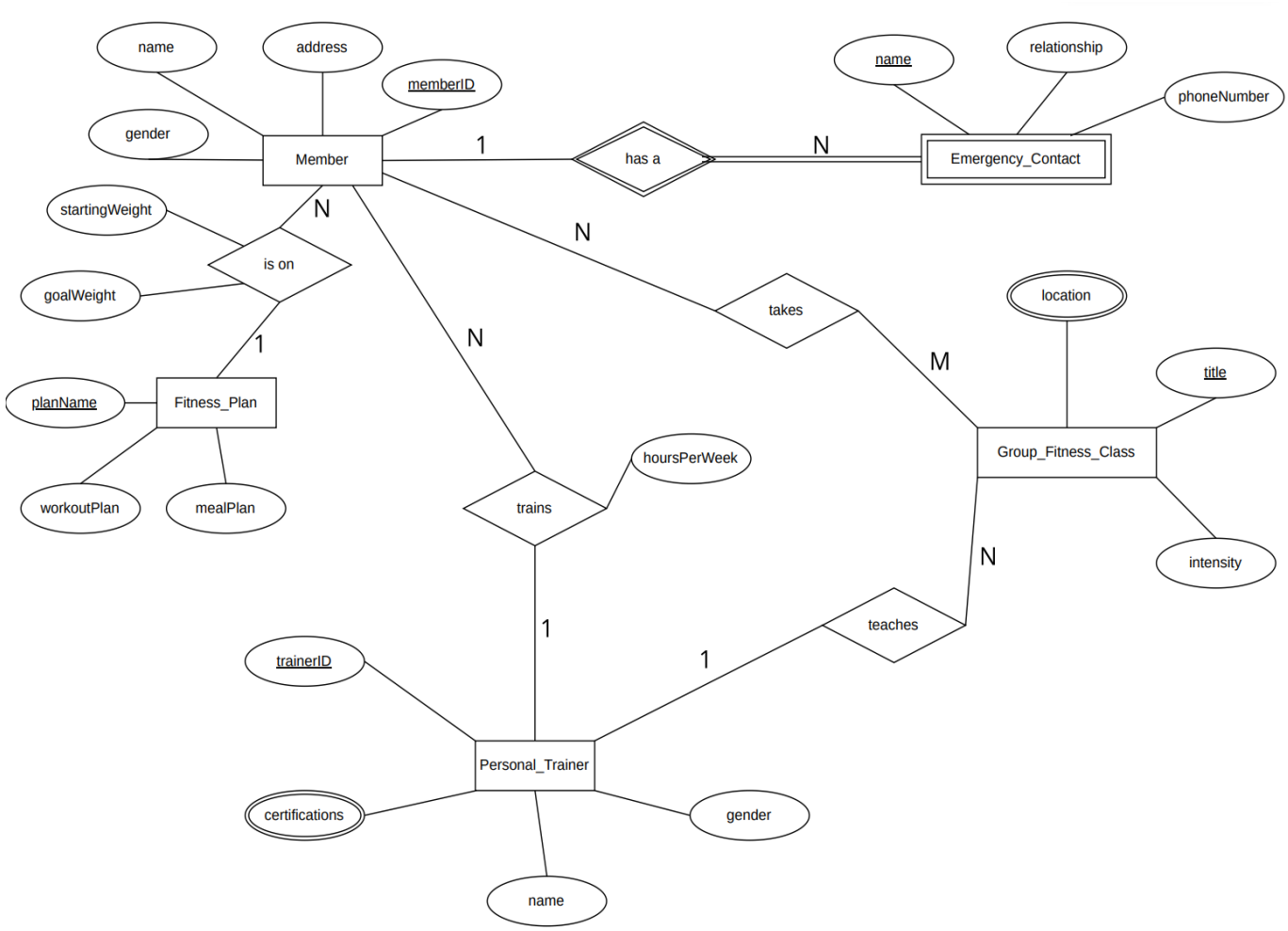
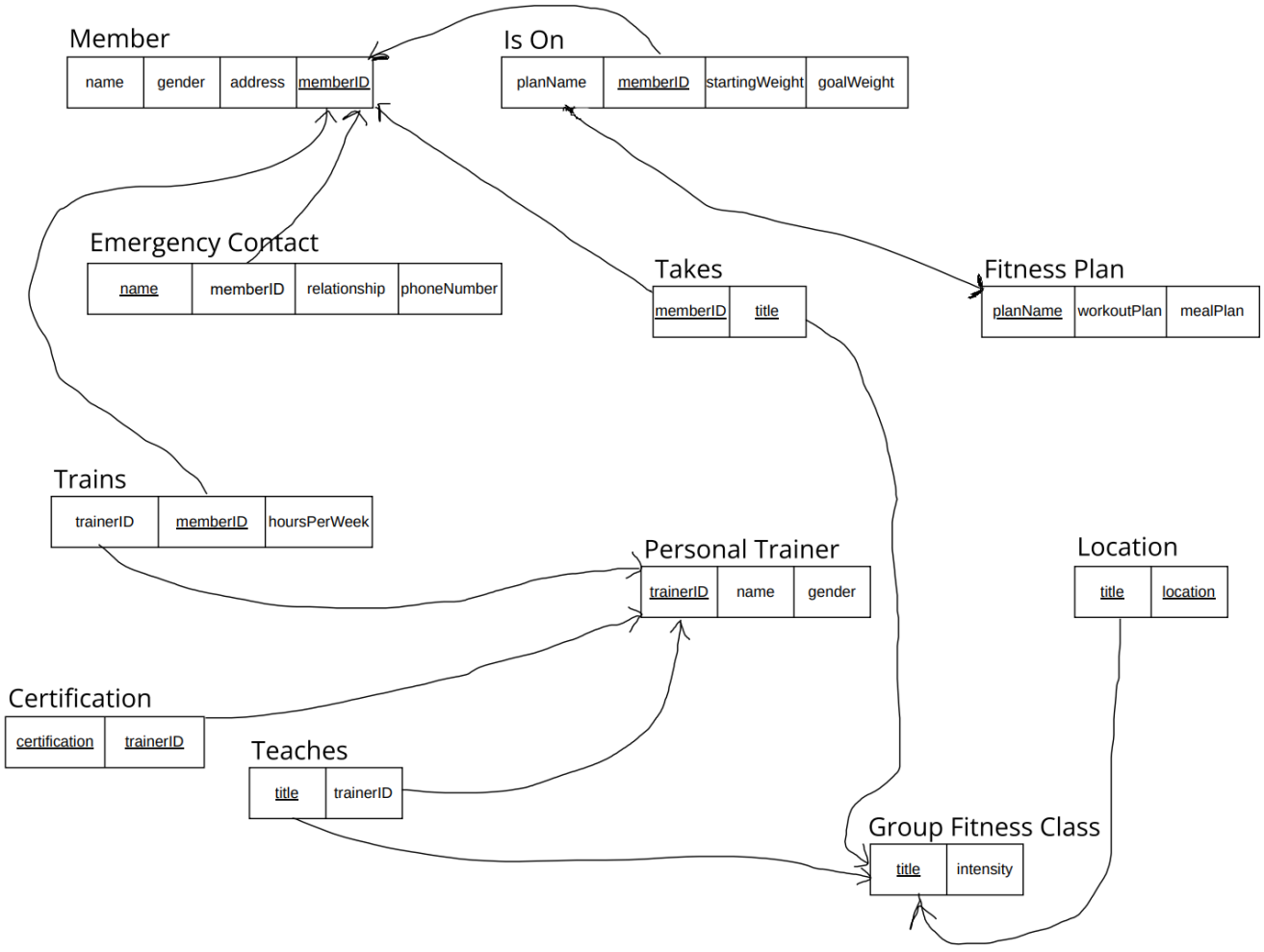
2.1 Conceptual Design:

- Members register with name, address, gender, and a unique member ID.
- Members are able to provide emergency contact(s) in case of injury. For each contact added, they must provide a phone number, their relationship to said contact, and a unique name (each contact may only be the emergency contact for one member).
- Members have access to a variety of fitness plans. Should they choose to select one (a member is limited to one fitness plan), the fitness plan comes with a workout plan, and meal plan. Each fitness plan has a unique name. The member's starting weight and goal weight will be noted upon joining a fitness plan. Fitness plans are available to multiple members at a time.
- Members are able to book a personal trainer for a set number of hours weekly (weekly hours will be noted). Each personal trainer is available to any number of members. The name, gender, unique trainer ID, and certifications (can be multiple) of each personal trainer is noted.
- Members are able to sign up for as many group fitness classes as they would like. Any number of members can sign up for a group fitness class. Each fitness class has a set intensity, a unique title, and multiple locations. Each group fitness class is taught by a personal trainer. Trainers can teach as many group fitness classes as they would like.

ER-diagram:


name
address
memberID
gender
Member
1
has a
N
name
relationship
phoneNumber
Emergency_Contact
startingWeight
N
is on
goalWeight
1
N
takes
location
M
title
planName
Fitness_Plan
N
hoursPerWeek
Group_Fitness_Class
workoutPlan
mealPlan
trains
N
intensity
1
teaches
1
trainerID
Personal_Trainer
certifications
gender
name

2.2 Relation Schemas:



2.3 Normalization of Relation Schemas:

All relations are in first normal form (1NF) because they do not contain multivalued attributes, composite attributes, or a combination of the two.

Relation	Functional Dependencies
Member	● memberID → address ● memberID → gender ● memberID → name
Is On	● memberID → startingWeight ● memberID → goalWeight ● memberID → planName
Emergency Contact	● name → relationship ● name → phoneNumber ● name → memberID
Takes	none
Fitness Plan	● planName → workoutPlan ● planName → mealPlan
Trains	● memberID →trainerID ● memberID → hoursPerWeek
Personal Trainer	● trainerID → name ● trainerID → gender
Location	none
Certification	none
Teaches	● title → trainerID
Group Fitness Class	● title → intensity

All functional dependencies are listed above, and all of them are full functional dependencies. Therefore, all relations are in second normal form (2NF).

Note as well that there are no transitive dependencies, and so all relations are in third normal form (3NF). So, we can conclude that the relation schema is normalized, and no changes need to be made to the schema.

2.4 Database Schema Diagram: