C3005- Project Report - Group 164
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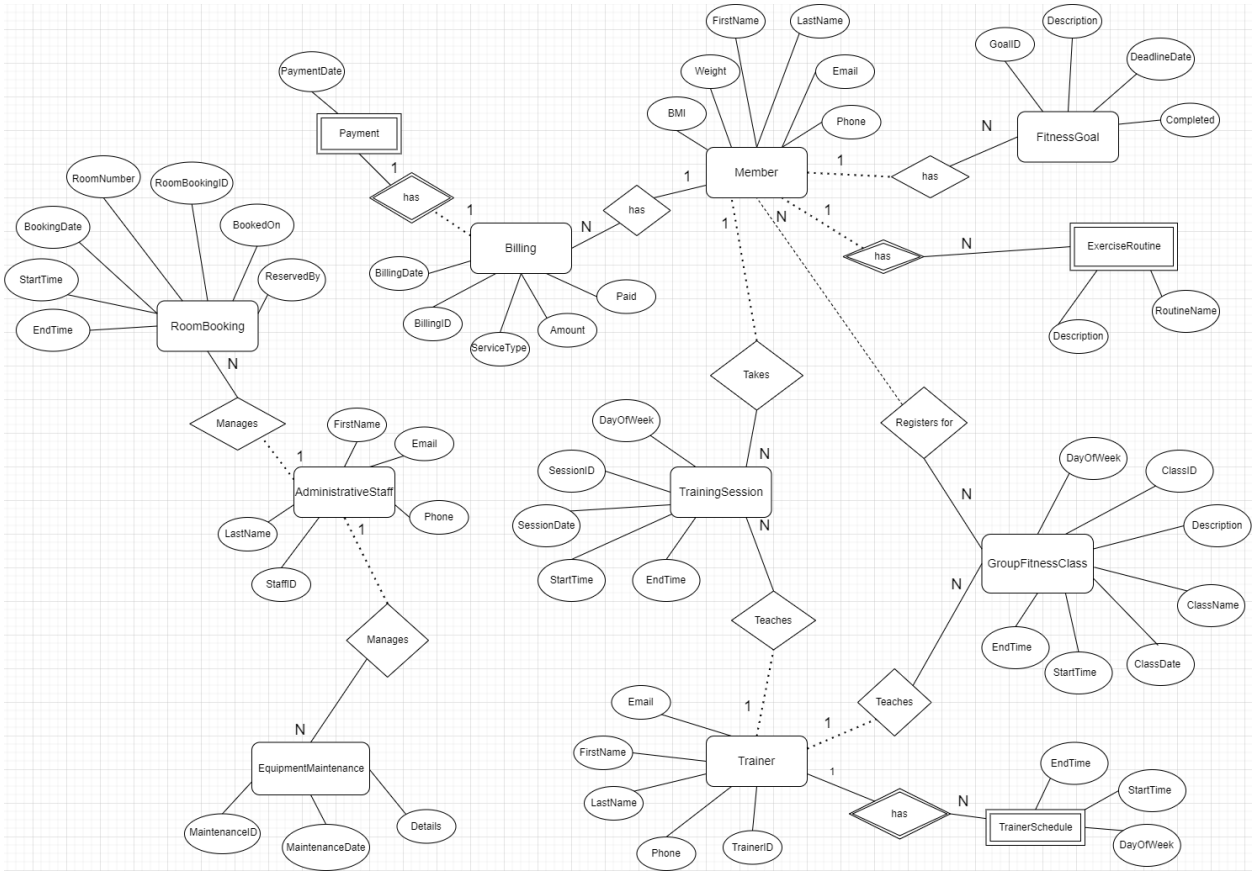


Note: Dotted lines represent partial participation and Full line represent total participation.

Mapping Table

Requirement	Assumption	Representation in ER diagram
This system will serve as a comprehensive platform catering to the diverse needs of club members, trainers, and administrative staff	There's at least 3 entities: members, trainers and administrative staff	Entities Member, Trainer, Administrative Staff
Members should be able to register and manage their profiles, establish personal fitness goals (you can determine suitable fitness goals such as weight and time, and members will set the values), and input health metrics	A member uses the services of the Health and Fitness Club. A member has to have some personal info, namely their FirstName, their LastName, their email address, their phone number. A member has to be recorded in the system with some ID number. A member also has to have their health metric related. Health metrics related to fitness can be weight, bmi Members will log onto the club portal through their email address.	Member entity has attributes: MemberID, FirstName, LastName, Email, Phone, Weight and BMI
Members should be able to register and manage their profiles, establish personal fitness goals (you can determine suitable fitness goals such as weight and time, and members will set the values), and input health metrics	A member can have no exercise routine. They can also have many exercise routines. An exercise routine can have a name and a description. Hence exercise routine is a new entity. A member doesn't necessarily have to have an exercise routine but an exercise routine has to be associated with a member. An exercise routine recorded is associated with 1 member	Weak entity ExerciseRoutine was created. It has attributes RoutineName and Description. Member has a partial relation to ExerciseRoutine while ExerciseRoutine has a total participation to Member. Relationship Member to Relation is 1 to many.

	only The attribute of exercise routine can't fully identify a record. Some members can think alike and name their routine the same way and have the same exercises description. Therefore exercise routine is a weak entity.	
Members should be able to register and manage their profiles, establish personal fitness goals (you can determine suitable fitness goals such as weight and time, and members will set the values), and input health metrics	A member can have many and also no personal fitness goals. Therefore a member doesn't need to have a personal goal but a personal fitness goal has to be related to a member. Fitness goal is also a new attribute, it can have some description and a deadline date and a boolean marking it as completed. No attribute of fitness goal is able to completely identify a record, even combining it with a memberID is not enough. Hence we are forcing FitnessGoal to be an entity and not just a weak entity by forcing an attribute GoalID to uniquely identify a fitness goal in the relation. Example scenario of why combining attributes isn't enough. Due to human nature, people tend to be vague and give themselves broad deadlines/common deadlines when it comes to fitness goal. Let's say somebody puts a fitness goal "increase bench press load" and they want to achieve this by next year so deadline is "2024-12-31". Now let's say that person	Entity FitnessGoal created. This was originally a weak entity but since even combining MemberID and the entity attributes will not be enough to identify a record, the attribute GoalID was added to be a primary key later on. A member doesn't necessarily need to have a fitness goal. So a member has partial participation to fitnessGoal entity. A fitness goal has to be associated to a member so fitnessGoal has total participation to member. A member can have multiple fitness goal while a fitness goal is related to one member only. Relation member to fitness goal is 1 to many.

	accomplishes that goal but forgets to mark it as completed. Then some time later during the year they want to again increase their bench press load. And they again give themselves till next year to get it done. Since that person never marked the first one as completed, there will be 2 fitness goal with the same description, same completed boolean value and same MemberID associated to.	
Members can schedule, reschedule, or cancel personal training sessions with certified trainers	Training session is a new entity, it can have a date, the starting time, the ending time, the day of week it is happening. A training session is related to only one member and one trainer at a time. A training session has to have a member and a trainer. A member doesn't necessarily have to have a training session. A trainer doesn't necessarily have to be involved in teaching personal training sessions.	TrainingSession entity with attributes SessionDate, StartTime, EndTime. Relation Member to Training Session is 1 to many. Relation Trainer to TrainingSession is 1 to many. There's a partial relation from Member to TrainingSession while there's a total participation from TrainingSession to Member. There's a partial relation from Trainer to TrainingSession while there is a Total participation from TrainingSession to Trainer.
Additionally, they should be able to register for group fitness classes	Fitness group classes have a date, a starting time, an end time, a trainer, multiple members. It's a new entity. A member can register for no group classes or they can also register to multiple classes. Fitness group classes are taught by the trainers in the	FitnessGroupClass entity with attributes ClassID, ClassName, ClassDate, StartTime, EndTime, Description. Relation member to fitness group class is partial while relation from group class to relation is total since a class has to have members registered to it.

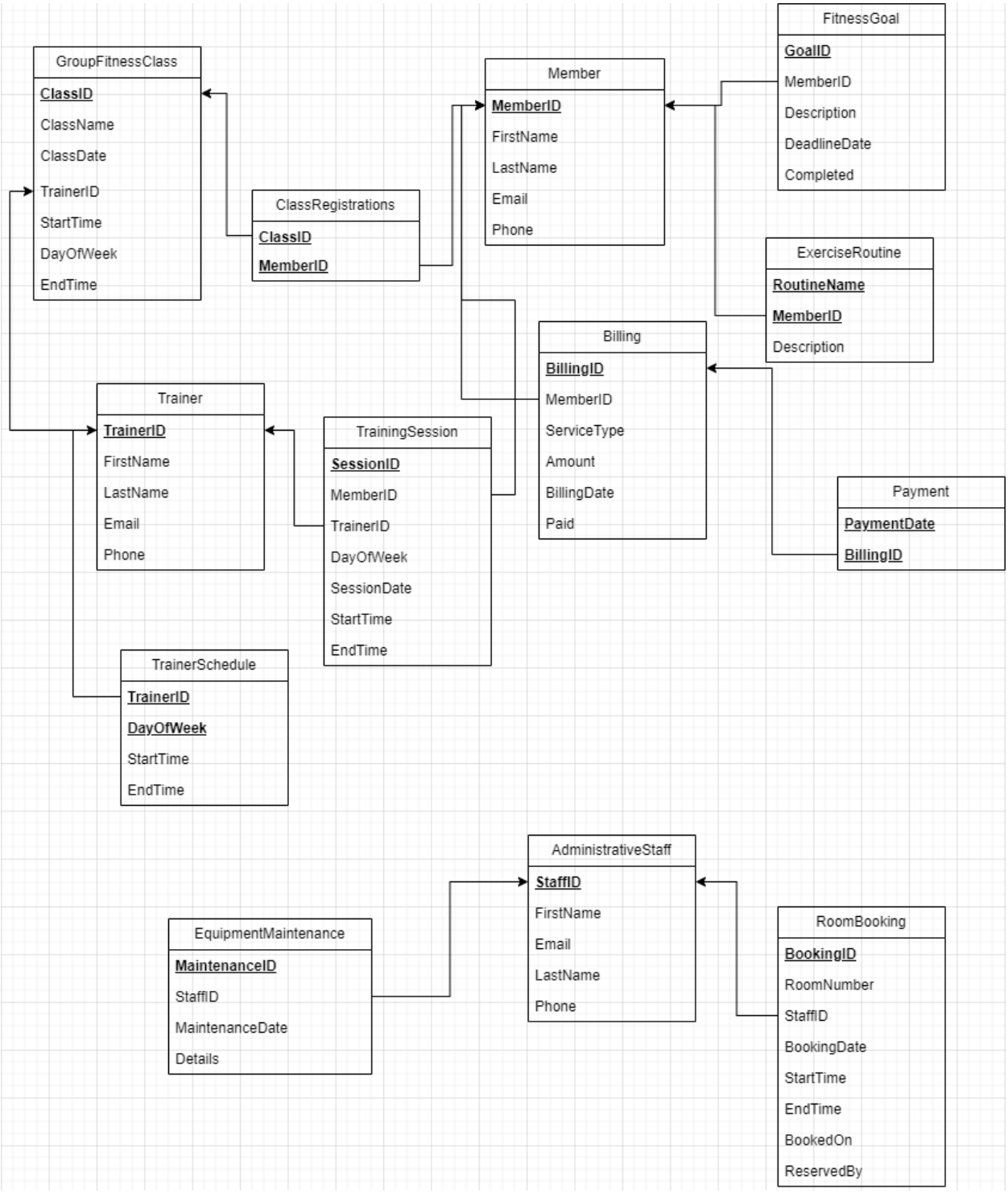
	club. A class has on trainer. A trainer during their course of employments have thoughts no classes or many classes.	Relation member to fitness group class is many to many (a class has many members and a member has many classes) Relationship trainer to fitness group class is partial participation. Relationship fitness group class to trainer is total participation. Relation trainer to fitness group class is 1 to many
Trainers should have the ability to manage their schedules and view member profiles.	Trainer is full entity with an id, a name, email, phone. A trainer has a schedule (shifts). A shift/schedule record has a starting time, an ending time and a day of the week the shift is happening. It's an entity. The attributes of a shift are not enough to uniquely identify itself. TrainerSchedule is a weak entity. A trainer has to one at least 1 shift since they are formally employed. A shift record/schedule record is only associated with 1 trainer. A trainer has to have a shift and a shift has to have a trainer associated to it.	Trainer Schedule weak entity created with attributes DayOfWeek, StartTime, EndTime. Relationship trainer to trainerSchedule in both ways is total participation. Relation trainer to trainerSchedule is 1 to many.
Administrative Staff should be equipped with features to manage room bookings,	Administrative staff is an entity with a name, an email, a phone number, an ID.	Entity AdministrativeStaff with attributes StaffID, FirstName, LastName, Email, Phone

monitor fitness equipment maintenance, update class schedules, oversee billing, and process payments for membership fees, personal training sessions, and other services		
Administrative Staff should be equipped with features to manage room bookings, monitor fitness equipment maintenance, update class schedules, oversee billing, and process payments for membership fees, personal training sessions, and other services	A staff is in charge of room bookings. A room booking can have an id, a date it was booked one, the date of the booking itself, the room number of the room that was booked. We're assuming that room bookings can also be done by any third party. Thus when a request for booking is made, it has to be paid immediately. Therefore a roombooking doesn't have a billing since a billing implies that it can be paid at a later date. Hence billing will only be done onto members as we're assuming that their credit card is on file and it's guaranteed they will eventually pay. A staff can get notified to register a booking by the system or staff can make changes to the booking when the person who made the booking calls to make changes or ask the staff at front desk to make changes. We record the staffID of the staff in charge/that made the latest update to a roombooking so that if something goes wrong with the booking, the employer knows which staff is to blame.	Entity RoomBooking, has attributes RoomNumber, BookedOn date, BookingDate date, StartTime, Endtime RoomBooking is not associated to billing. Billing is only associated to Members. Staff too aren't associated to billings as a billing has nothing to do with a staff. The staff is just the user on the system with high enough privilege to make changes to the billing database. A roombooking has to have a staff that registered it/made the last update to it. A staff doesn't necessarily have to have recorded/updated a room booking during their time of employment. Hence relationship from roombooking to staff is total participation while relationship from staff to roombooking is partial participation. Relationship from staff to roombooking is 1 is to many

	The logic behind assuming room bookings can be done by third parties is that rooms in a fitness clubs would normally be rented/booked by private teachers. It can be a private martial art teacher for example. I personally took a class like this so that's why i thought like this. Staff would normally have to have the room set up, cleaned, disinfected, sanitised etc and for that reason a room can only be booked by one person for one day even though the booking itself doesn't last the whole today. Let's say somebody books room 4 for 20th October, then room 4 is closed off for the day of 20th October, no other person can book it.	
Administrative Staff should be equipped with features to manage room bookings, monitor fitness equipment maintenance, update class schedules, oversee billing, and process payments for membership fees, personal training sessions, and other services	Staff are in charge of equipment maintenance. They probably have to make reports on the latest maintenance montinoring. Hence an equipment maintenance report has a report ID and the details of the report. A staff doesn't necessarily have to have had filed a maintenance report during their employment. They could also have filed many such reports. A maintenance report is written by only one staff and it has to have a staff related to it.	Entity EquipmentMaintenace has attributes MaintenanceID, MaintenanceDate, Details Staff to EquipmentMaintenace is partial participation wile relationship EquipmentMaitence to Staff has total participation Relationship staff to EquipmentMaintenace is 1 is to many.
Administrative Staff should be equipped with features to	A member is billed membership fees/session	Billing Entity created, it has attributes BillingID,

manage room bookings, monitor fitness equipment maintenance, update class schedules, oversee billing, and process payments for membership fees, personal training sessions, and other services	fees etc. Hence a bill is associated with a member. A bill can have a billID, the date the bill was made, the amount of the bill, the reason why this bill was made. The date the bill was paid. It's an entity Since bills can be paid later in the future, while a bill is unpaid, the payment date would be NULL. Since most people don't pay their bills as they come out, many records in the database would have NULL values. I'm also not really comfortable working with NULL values, hence i also created an entity Payment which simply tracks the date the bill was paid. Staff oversee billing but they are not related to a bill. A bill can be filed by a staff but it can also be filed by the system automatically. Like when a person sign up to the club and they are automatically filed membership fees.	BillingDate, Amount, ServiceType,Paid(bool) Payment Entity created, it has attribute paymentDate. A bill is related to one member only. A member can have multiples bills and at least one bill. So participation on both sides is total. A bill doesn't have to have a payment but a payment has a bill. So there's a partial participation from Billing to Payment but a total participation from payment to billing. Relation from member to billing is 1 to many. Relationship from billing to payment is 1 to 1

ER SCHEMA


GroupFitnessClass
ClassID
ClassName
ClassDate
TrainerID
StartTime
DayOfWeek
EndTime
ClassRegistrations
ClassID
MemberID
Member
MemberID
FirstName
LastName
Email
Phone
FitnessGoal
GoalID
MemberID
Description
DeadlineDate
Completed
ExerciseRoutine
RoutineName
MemberID
Description
Billing
BillingID
MemberID
ServiceType
Amount
BillingDate
Paid
Payment
PaymentDate
BillingID
Trainer
TrainerID
FirstName
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SessionID
MemberID
TrainerID
DayOfWeek
SessionDate
StartTime
EndTime
TrainerSchedule
TrainerID
DayOfWeek
StartTime
EndTime
AdministrativeStaff
StaffID
FirstName
Email
LastName
Phone
EquipmentMaintenance
MaintenanceID
StaffID
MaintenanceDate
Details
RoomBooking
BookingID
RoomNumber
StaffID
BookingDate
StartTime
EndTime
BookedOn
ReservedBy

Relations and their primary&foreign keys:

Member: Primary Key → MemberID
FitnessGoal: Primary Key → GoalID, ForeignKey → MemberID
ExerciseRoutine: Primary Key → Combination of RoutineName and MemberID(foreign key)
Billing: Primary Key → BillingID , Foreign Key → MemberID
Payment: Primary Key → Combination of BillingID and PaymentDate
Trainer: Primary Key → TrainerID
TrainerSchedule: Primary Key → Combination of TrainerID(foreign key) and DayofWeek
TrainingSession: Primary Key → SessionID, Foreign Keys → MemberID, TrainerID
GroupFitnessClass: Primary Key → ClassID, ForeignKey → TrainerID
ClassRegistrations: Primary Key → Combination of ClassID and MemberID
AdministrativeStaff: Primary Key → StaffID
RoomBooking: Primary Key → BookingID , Foreign Key → StaffID
EquipmentMaintenance: Primary Key → MaintenanceID, ForeignKey → StaffID