Health and Fitness Club Management System

Fahim Ali, Rafique Siddique

2.1. Conceptual Design

The conceptual design of the database involves creating an Entity-Relationship (ER) diagram for the Health and Fitness Club Management System. The ER diagram visually represents the entities, relationships between them, and the attributes associated with each entity. Assumptions regarding cardinalities and participation types are made based on the information provided in the problem statement.

Entities:

- Member:
    - Attributes: MemberID (Primary Key), FirstName, LastName, Email, PhoneNumber, Address, DateOfBirth, Gender, RegistrationDate
- Trainer:
    - Attributes: TrainerID (Primary Key), FirstName, LastName, Email, PhoneNumber, Specialization, Certification
- Event:
    - Attributes: EventID (Primary Key), EventName, EventType, Date, Time, Location, MaxParticipants
- MaintenanceLog:
    - Attributes: MaintenanceID (Primary Key), EquipmentName, MaintenanceDate, Description, MaintenanceCost
    - Relationships: AdminStaff (Conducts)
- MembershipPackage:
    - Attributes: PackageID (Primary Key), PackageName, PackageCost, PackageDetails
    - Relationships: AdminStaff (Sells it)
- AdminStaff:
    - Attributes: StaffID (Primary Key), Role, FirstName, LastName
    - Relationships: Billing (Manages), MaintenanceLog (Manages), MembershipPackage(Sells), NutritionPlan(Sells)
- Dashboard:
    - Attributes: DashboardID (Primary Key), MemberID, Statistics, Achievements, Goals
    - Relationship: Member (Has)
- StaffSchedule:
    - Attributes: ScheduleID (Primary Key), StaffID, DaysOfWeek
    - Relationships: InstructorAvailability(Based On)
- Feedback:
    - Attributes: FeedbackID (Primary Key), FeedbackText, FeedbackDate, StaffID
    - Relationships: Member(Creates)
- NutritionPlan:
    - Attributes: PlanID (Primary Key), PlanName, PlanDescription, PlanCost
    - Relationships: Member(Can Have)
- InstructorAvailability:

    - Attributes: AvailabilityID (Primary Key), TrainerID, DaysOfWeek, StartTime, EndTime
    - Relationship: AdminStaff(Uses)
- Billing:
    - Attributes: BillingID (Primary Key), TransactionDate, Amount
    - Relationships: AdminStaff (Manages)
- Booking:
    - Attributes: BookingID (Primary Key), BookingType, Time, Date
    - Relationships: Event (Book), Members(Can)
- Event:
    - Attributes: EventID, EventType, EventName
    - Relationship: Trainer (Teaches), Booking(Book)
- Class:
    - Attributes: ClassID (Primary Key), ClassName, ClassDescription
- ClassAttendance:
    - Attributes: AttendanceID, ClassID, MemberID, AttendanceStatus, AttendanceDate

Assumptions:

Cardinalities and Participation Types:

- A Member can participate in zero or more Training Sessions, Fitness Classes, and Workshops (participation type: total).
- A Trainer can conduct zero or more Training Sessions, Fitness Classes, and Workshops (participation type: total).
- A Training Session is conducted by exactly one Trainer and can have multiple participating Members (cardinality: 1:N).
- A Fitness Class is conducted by exactly one Trainer and can have multiple participating Members (cardinality: 1:N).
- A Workshop is conducted by exactly one Trainer and can have multiple participating Members (cardinality: 1:N).
- A Member owns exactly one Dashboard (cardinality: 1:1).
- A Member can have zero or more Schedules, and a Schedule belongs to exactly one Member (cardinality: 0..N:1).
- A Training Session has zero or more Progress Notes, and a Progress Note belongs to exactly one Training Session (cardinality: 0..N:1).
- A Fitness Class and Workshop use one or more Rooms, and a Room is used by zero or more Fitness Classes and Workshops (cardinality: M:N).
- A Room contains zero or more Equipment, and an Equipment belongs to exactly one Room (cardinality: 0..N:1).
- A Member receives zero or more Billings, and a Billing belongs to exactly one Member (cardinality: 0..N:1).
- A Member makes zero or more Payments, and a Payment belongs to exactly one Member (cardinality: 0..N:1).

2.3

1. Members: Member_ID, Email, First_Name, Last_Name, Weight. Height,fitness goal

Primary Key: Member_ID
Dependencies:
{Member_ID} -> {Email, First_Name, Last_Name, Weight, Height, Fitness_Goal}
The table is in 2NF and 3NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

2. Feedback: FeedbackID, FeedbackText, FeedbackDate

Primary key: FeedbackID
Dependencies:
{FeedbackID} -> {FeedbackText, FeedbackDate}
The table is in 2NF and 3NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

3. Booking: BookingID, BookingType,Time,Date

Primary key: BookingID
Dependencies:
{BookingID} -> {BookingType, Time, Date}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. There doesn't seem to be a transitive dependency

4. Dashboard: DashbardID,Statistics, MemberID,Achievements,goals

Primary key: DashboardID
Dependencies:
{DashboardID} -> {Statistics, MemberID, Achievements, goals}
The table is in 2NF and 3NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

5. NutritionPlan: PlanID, PlanName,PlanDescription,PlanCost, MemberID

Primary key: NutritionPlanID
Dependencies:
{NutritionPlanID} -> {PlanName, PlanDescription, PlanCost, MemberID}
The table is in 2NF and 3NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

6. AdminStaff: StaffID, Role, FirstName, LastName

Primary key: StaffID
Dependencies:
{StaffID} -> {Role, First_Name, Last_Name}

The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

7. Billing: BillingID, Amount, TransactionDate

Primary key: BillingID
Dependencies:
{BillingID} -> {Amount, TransactionDate}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

8. MaintenanceLog: logID,EqiupmentID,MaintenanceDate, Description, MaintenanceCost

Primary key: logID
Dependencies:
{logID} -> {EquipmentID, MaintenanceDate, Description, MaintenanceCost}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

9. MembershipPackage: PackageID, PackageName, packageCost, packageDetails

Primary key: PackageID
Dependencies:
{PackageID} -> {PackageName, PackageCost, PackageDetails}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

10. InstructorAvailability: AvailabilityID,EndTime,StartTime,DayOfWeek

Primary key: AvailabilityID
Dependencies:
{AvailabilityID} -> {EndTime, StartTime, DayOfWeek}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

11. StaffSchedule: ScheduleID, DayOfWeek,EndTime,StartTime

Primary key: ScheduleID
Dependencies:
ScheduleID} -> {DayOfWeek, EndTime, StartTime}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

12. Event: EventID, Eventtype, eventname

Primary key: EventID
Dependencies:
{EventID} -> {EventType, EventName}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

13. Trainer:TrainerID, Certification,firstname,lastname
Primary key: TrainerID
Dependencies:
{TrainerID} -> {Certification, FirstName, LastName}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

14. Class:ClassID, classname, classdescription
Primary key: ClassID
Dependencies:
{ClassID} -> {ClassName, ClassDescription}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

15. class schedule:scheduleID,session time, type
Primary key: scheduleID
Dependencies:
{ScheduleID} -> {SessionTime, Type}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.

16. classAttendance:AttendanceID, AttendanceStatus, attendanceDate
Primary key: AttendanceID
Dependencies:
{AttendanceID} -> {AttendanceStatus, AttendanceDate}
The table is in 2NF because all non-prime attributes are fully functionally dependent on the entire primary key. Additionally, there aren't any transitive dependencies.