

# **G1-T11**

## **Gym Membership System**

### **ERD**

**Mentor: Prof. P.M.Jat**

#### **Team Members:**

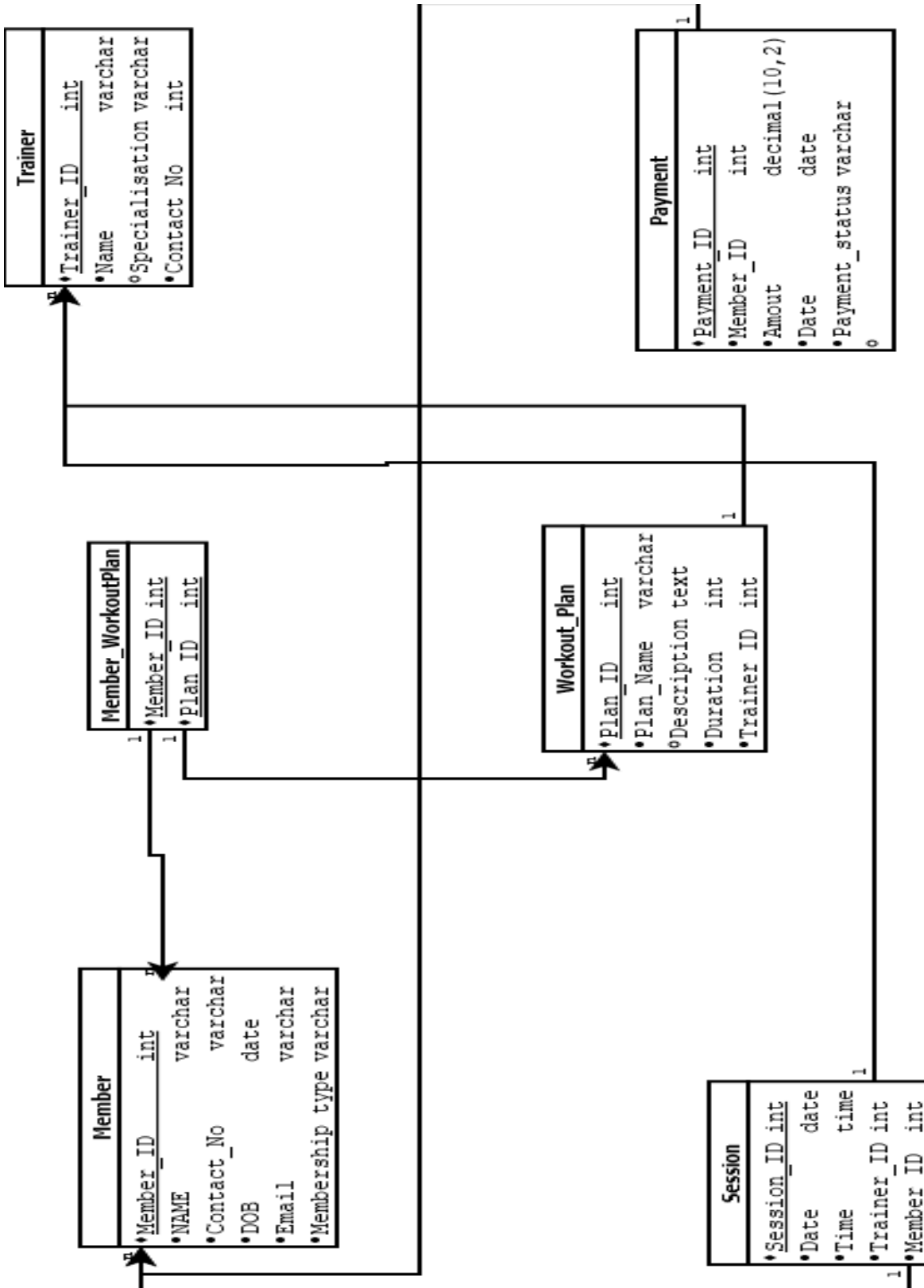
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4. Vrajesh Dabhi – 202301063

#### **Team Representative:**

Name: Jenish Vasani

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# Relational Schema



## Minimal FD Set

1. Member\_ID  $\rightarrow$  Name  
Member\_ID  $\rightarrow$  Contact\_No  
Member\_ID  $\rightarrow$  DOB  
Member\_ID  $\rightarrow$  Email  
Member\_ID  $\rightarrow$  Membership\_Type
2. Trainer\_ID  $\rightarrow$  Name  
Trainer\_ID  $\rightarrow$  Specialization  
Trainer\_ID  $\rightarrow$  Contact\_No
3. Plan\_ID  $\rightarrow$  Plan\_Name  
Plan\_ID  $\rightarrow$  Description  
Plan\_ID  $\rightarrow$  Duration  
Plan\_ID  $\rightarrow$  Trainer\_ID
4. Session\_ID  $\rightarrow$  Date  
Session\_ID  $\rightarrow$  Time  
Session\_ID  $\rightarrow$  Trainer\_ID  
Session\_ID  $\rightarrow$  Member\_ID
5. Payment\_ID  $\rightarrow$  Member\_ID  
Payment\_ID  $\rightarrow$  Amount  
Payment\_ID  $\rightarrow$  Date  
Payment\_ID  $\rightarrow$  Payment\_Status
6. Member\_ID, Plan\_ID  $\rightarrow$  Member\_ID  
Member\_ID, Plan\_ID  $\rightarrow$  Plan\_ID

# BCNF Proof

1. Member(Member\_ID, Name, Contact\_No, DOB, Email, Membership\_Type)

**FD:** Member\_ID → Name, Contact\_No, DOB, Email, Membership\_Type

**Proof:**

- Member\_ID is the only determinant and appears on the left-hand side of all dependencies.
- Member\_ID is the primary key (superkey).
- No other non-trivial FDs exist.

**Conclusion:** Satisfies BCNF.

2. Trainer(Trainer\_ID, Name, Specialization, Contact\_No)

**FD:** Trainer\_ID → Name, Specialization, Contact\_No

**Proof:**

- Trainer\_ID is the primary key.
- It determines all other attributes.
- No other FDs exist.

**Conclusion:** Satisfies BCNF.

3. Workout\_Plan(Plan\_ID, Plan\_Name, Description, Duration, Trainer\_ID)

**FD:** Plan\_ID → Plan\_Name, Description, Duration, Trainer\_ID

**Proof:**

- Plan\_ID is the primary key.
- It determines all other attributes.
- No other FDs present.

**Conclusion:** Satisfies BCNF.

4. Session(Session\_ID, Date, Time, Trainer\_ID, Member\_ID)

**FD:** Session\_ID  $\rightarrow$  Date, Time, Trainer\_ID, Member\_ID

**Proof:**

- Session\_ID is the primary key.
- No partial or transitive dependencies.
- No other FDs mentioned.

**Conclusion:** Satisfies BCNF.

5. Payment(Payment\_ID, Member\_ID, Amount, Date, Payment\_Status)

**FD:** Payment\_ID  $\rightarrow$  Member\_ID, Amount, Date, Payment\_Status

**Proof:**

- Payment\_ID is the primary key.
- It determines all other attributes.

**Conclusion:** Satisfies BCNF.

6. Member\_WorkoutPlan(Member\_ID, Plan\_ID)

**FDs:**

- (Member\_ID, Plan\_ID)  $\rightarrow$  Member\_ID (trivial)
- (Member\_ID, Plan\_ID)  $\rightarrow$  Plan\_ID (trivial)

**Proof:**

- Composite key: (Member\_ID, Plan\_ID)
- Only trivial dependencies exist.
- No non-trivial FD with non-superkey LHS.

**Conclusion:** Satisfies BCNF.

**Final Summary:** Each relation satisfies BCNF because all non-trivial FDs have superkeys as determinants..

## DDL Script

```
CREATE TABLE Member (  
    Member_ID INT PRIMARY KEY,  
    Name VARCHAR(100),  
    Contact_No VARCHAR(15),  
    DOB DATE,  
    Email VARCHAR(100),  
    Membership_Type VARCHAR(50)  
);
```

```
CREATE TABLE Trainer (  
    Trainer_ID INT PRIMARY KEY,  
    Name VARCHAR(100),  
    Specialization VARCHAR(100),  
    Contact_No VARCHAR(15)  
);
```

```
CREATE TABLE Workout_Plan (  
    Plan_ID INT PRIMARY KEY,  
    Plan_Name VARCHAR(100),  
    Description TEXT,  
    Duration INT,  
    Trainer_ID INT,  
    FOREIGN KEY (Trainer_ID) REFERENCES Trainer(Trainer_ID)  
);
```

```
CREATE TABLE Member_WorkoutPlan (  
    Member_ID INT,  
    Plan_ID INT,  
    PRIMARY KEY (Member_ID, Plan_ID),  
    FOREIGN KEY (Member_ID) REFERENCES Member(Member_ID),  
    FOREIGN KEY (Plan_ID) REFERENCES Workout_Plan(Plan_ID)  
);
```

```
CREATE TABLE Session (  
    Session_ID INT PRIMARY KEY,  
    Date DATE,  
    Time TIME,  
    Trainer_ID INT,  
    Member_ID INT,  
    FOREIGN KEY (Trainer_ID) REFERENCES Trainer(Trainer_ID),  
    FOREIGN KEY (Member_ID) REFERENCES Member(Member_ID)  
);
```

```
CREATE TABLE Payment (  
    Payment_ID INT PRIMARY KEY,  
    Member_ID INT,  
    Amount DECIMAL(10, 2),  
    Date DATE,  
    Payment_Status VARCHAR(50),  
    FOREIGN KEY (Member_ID) REFERENCES Member(Member_ID)  
);
```