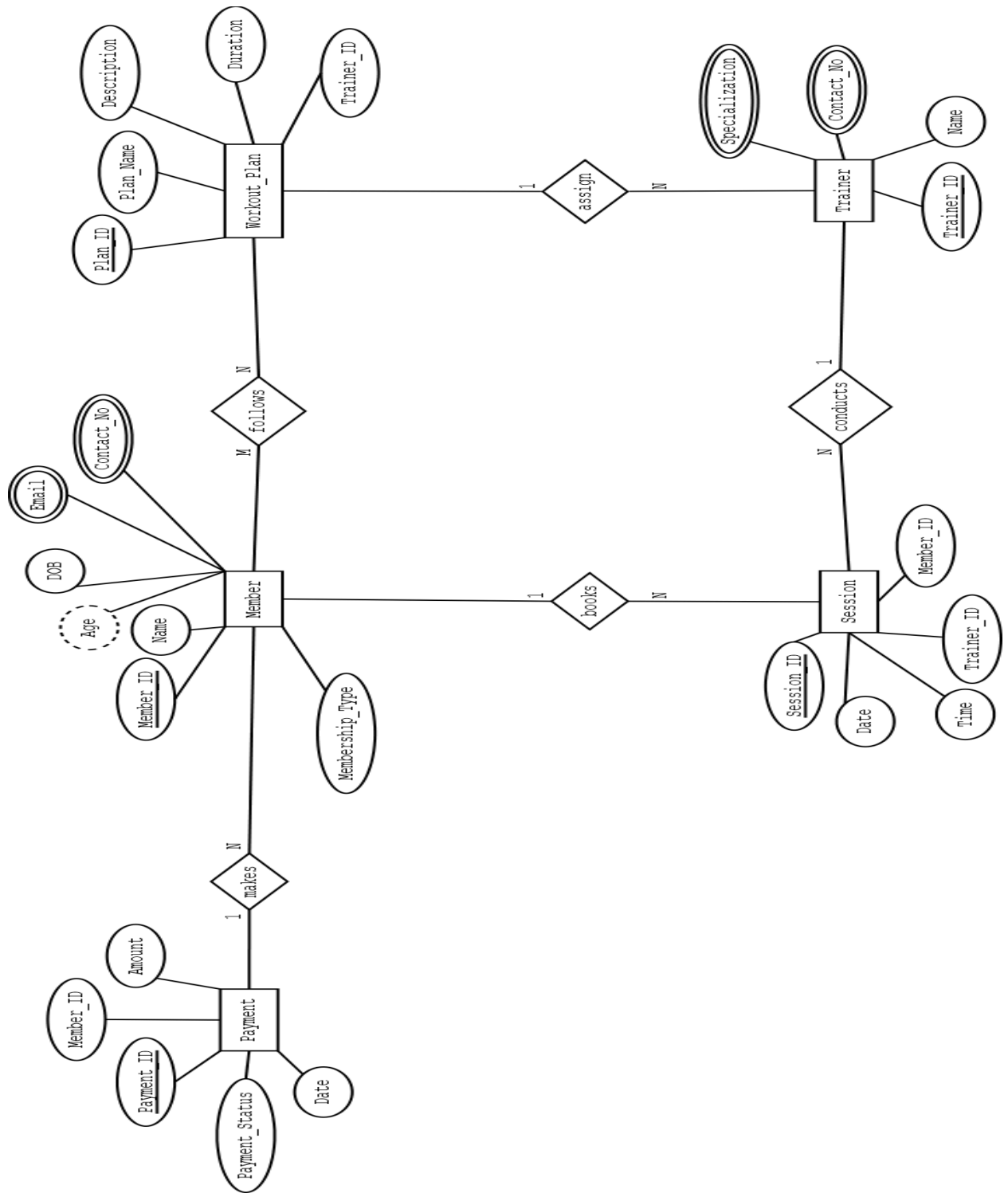
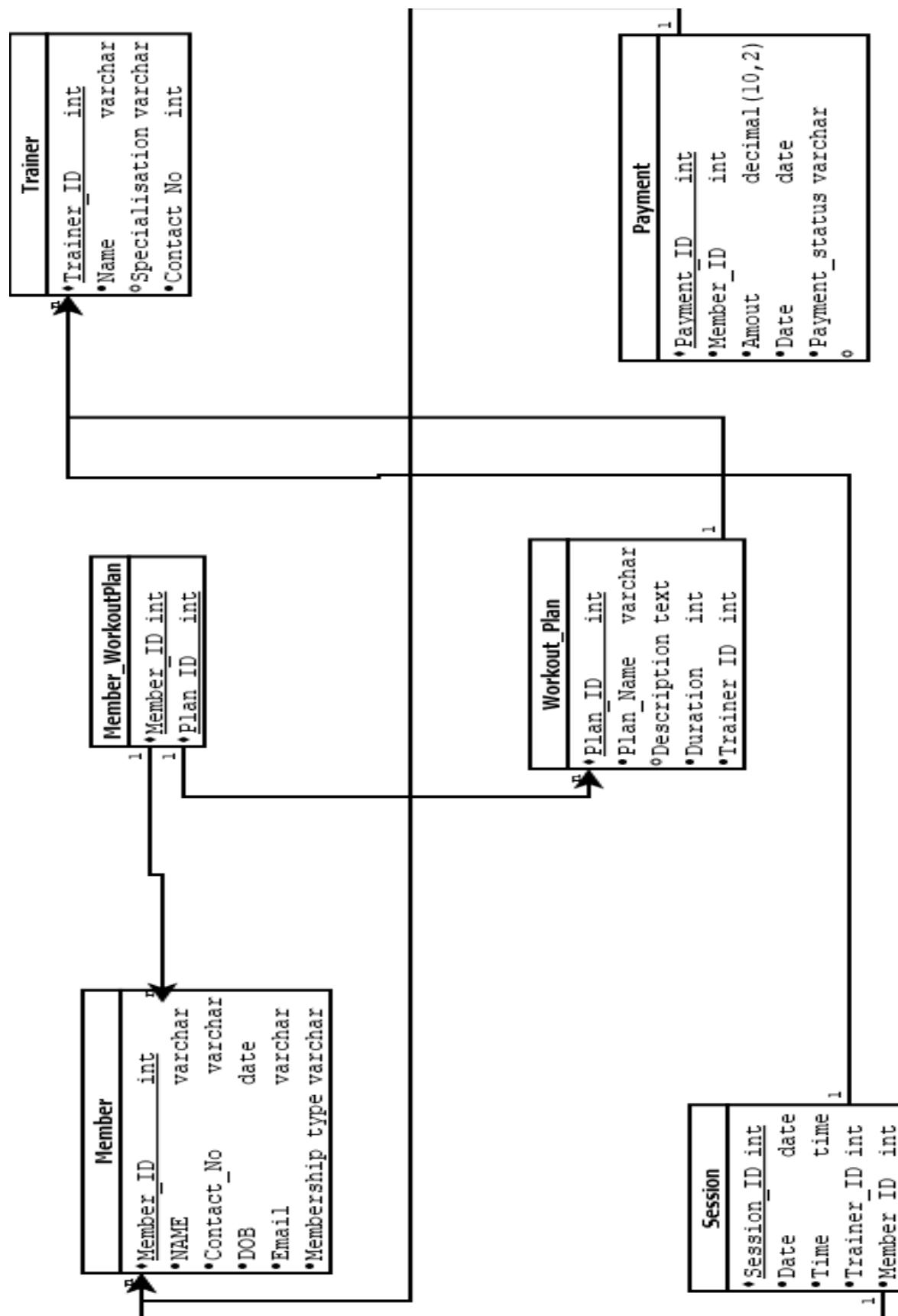


ERD Diagram



Relational Schema



BCNF Proff

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..