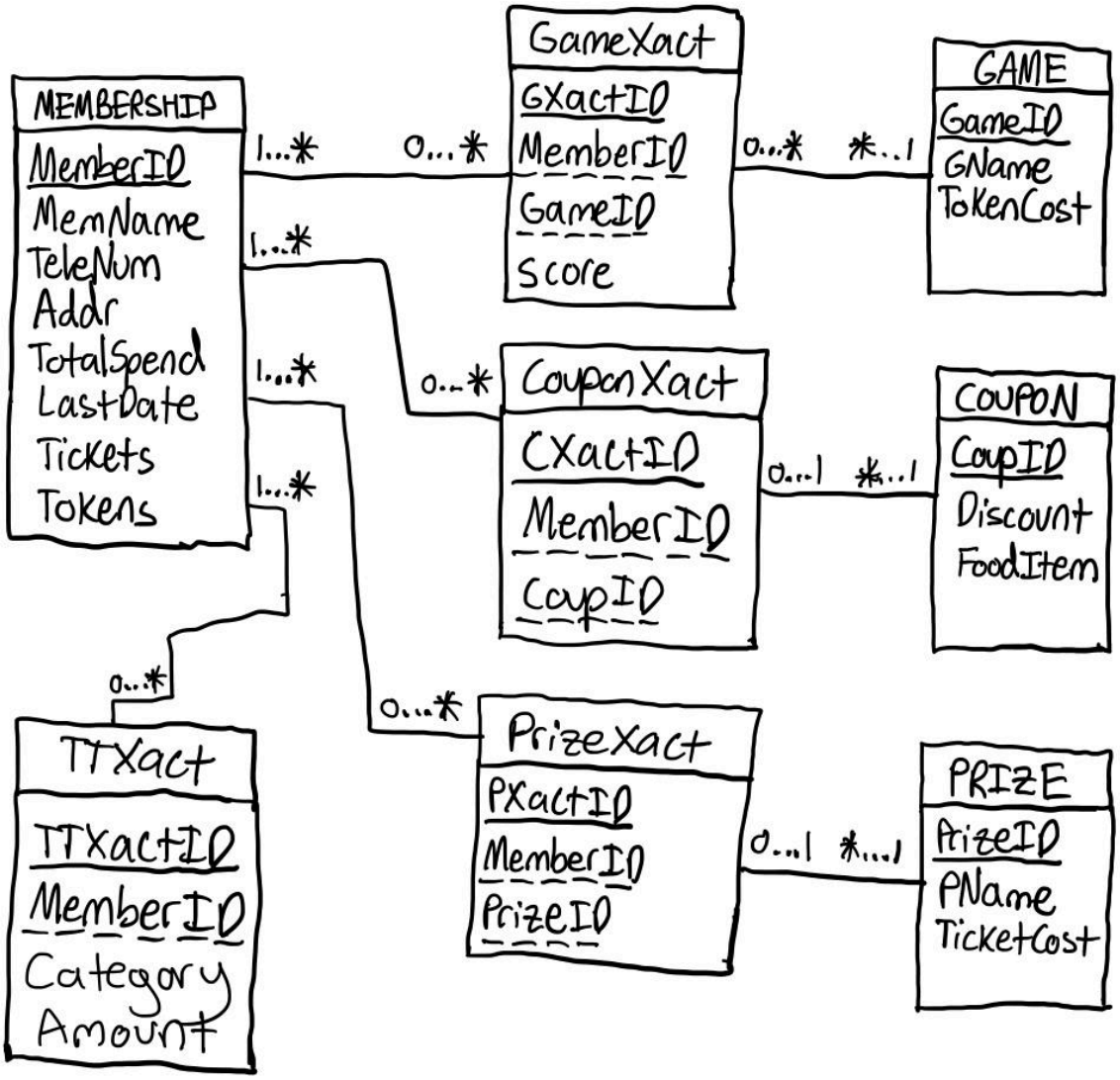
i. E-R Diagram (Conceptual Database Design)



- Membership tiers (Gold Member and Diamond Member) will be determined using a query within the JDBC implementation that will determine the tiers of each member based on their total spend (TotalSpend attribute).
- TTXact keeps track of ticket and token transactions by using the Category attribute to determine if the Amount attribute is the number of tickets or the number of tokens either added or subtracted from the corresponding Membership attributes.
- Each type of transaction has their own entity set so that they can be distinguishable.

ii. Relational Database Schema (Logical Database Design)

Membership(MemberID, Name, TeleNum, Addr, TotalSpend, LastDate, Tickets, Tokens)

TTXact(TTXactID, MemberID, Category, Amount, TDate)

Game(GameID, GName, TokenCost)

GXact(GXactID, MemberID, GameID, Score)

Prize(PrizeID, PName, TicketCost)

PrizeXact(PXactID, MemberID, PrizeID)

Coupon(CouponID, FoodItem)

CouponXact(CXactID, MemberID, CouponID)

iii. Nomalization Analysis

Membership Table

- FD(s): MembershipID → Name, TeleNum, Addr, TotalSpend, LastDate, Tickets, Tokens
- Since all attributes on the right-hand-side are all non-prime, the Membership table is in 3NF and since MembershipID is the superkey, the Membership table is also in BCNF.

TTXact Table

- FD(s): TTXactID → MemberID, Category, Amount, TDate
- Since all attributes are non-prime and there is only one candidate key, the TTXact table is in 3NF and since there are no partial dependencies, the TTXact table is also in BCNF.

Game Table

- FD(s): GameID → GName, TokenCost
- Since all attributes are non-prime, the Game table is in 3NF and since GameID is the only candidate key, the Game table is also in BCNF.

GameXact Table

- FD(s): GXactID → MemberID, GameID, Score
- Since all attributes are non-prime and there are no partial dependencies, the GXactID table is in both 3NF and BCNF.

Prize Table

- FD(s): PrizeID → PName, TicketCost

- Since all attributes are non-prime and there is only one candidate key, the Prize table is in both 3NF and BCNF.

PrizeXact Table

- FD(s): PXacID → MemberID, PrizeID
- Since all the attributes are non-prime and there are no partial dependencies, the PrizeXact table is in both 3NF and BCNF.

1. Coupon Table

- FD(s): CouponID → FoodItem
- Since all attributes are non-prime and there is only one candidate key, the Coupon table is in both 3NF and BCNF.

CouponXact Table

- FD(s): CXactID → MemberID, CouponID
- Since all attributes are non-prime and there are no partial dependencies, the CouponXact table is in both 3NF and BCNF.

iv. Query Description

Query: Member scores in each game-play for a specific game.

Utility: This query shows the progression of scores for a specific game that a particular member plays. This is useful for when a user of this system wants to check if a member is improving or getting worse when playing a specific game. This also can help determine if the game is too hard for members to play which can help determine if a game should be deleted.