CPMT 354 Mini Project

Due: Aug 2, 2023

1 Step 2: Project Specifications

Here are the design schemas of our library database:

Item(**itemID**, itemType, title, author, publisher, releaseDate, dueDate)

Person(**personID**, firstName, lastName, contactNumber, email)

BorrowTransaction(**transactionID**, itemID$^{FK-Item}$, personID$^{FK-Person}$, borrowDate, returnDate, fineAmount)

Event(**eventID**, eventType, eventPrice, socialRoom)

EventAudiences(**eventID**$^{FK-Event}$, **audienceID**$^{FK-Person}$)

Personnel(**personnelID**$^{FK-Person}$, jobTitle)

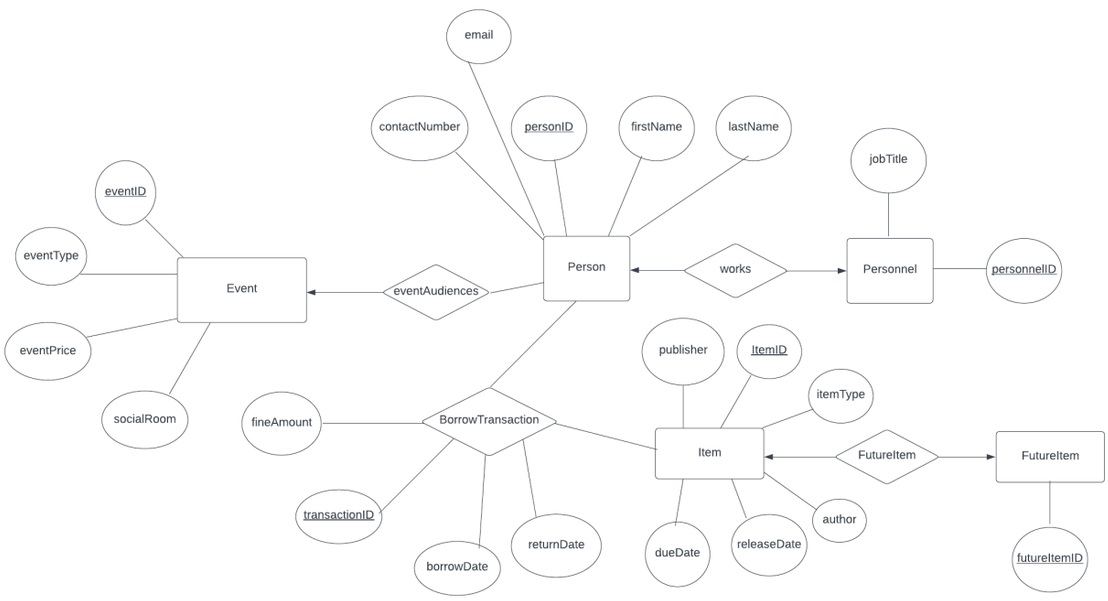
FutureItem(**futureItem**$^{FK-Item}$)

Notes:

- (Bold + Underline) represents primary key
- (Underline + Superscript) represents foreign key

2 Step 3: E/R Diagrams

The Entity-Relationship (E/R) model for our library database is shown as follows:



3 Step 4: Does your design allow anomalies?

Functional Dependencies (FDs):

- itemID → itemType, title, author, publisher, releaseDate, dueDate
- personID → firstName, lastName, contactNumber, email
- transactionID → itemID, personID, borrowDate, returnDate, fineAmount
- eventID → eventType, eventPrice, socialRoom
- personnelID → jobTitle

All FDs are non-trivial, but they all have superkey (itemID for table Item, personID for table Person, transactionID for table BorrowTransaction, eventID for table Event, personnelID for table Personnel) on their LHS, and hence these functional dependencies are normalized and the tables satisfy BCNF.

Relationship Schema:

In EventAudiences table, there exists composite key "eventID and audienceID" that defines a relationship. This satisfies BCNF as the functional dependency created is a trivial dependency, where the LHS is the prime key and RHS is an empty set $\emptyset$.

In FutureItem table, there exists a primary key "futureItem" that defines a relationship. This satisfies BCNF as the functional dependency created is a trivial dependency, where the LHS is the prime key and RHS is an empty set $\emptyset$.

Other Anomalies:

No insertion, update and deletion anomalies present in this database design. Some potential deletion anomalies such as deleting a person could lead to deleting related audience records were prevented by the normalized design and possibly triggers. This leaves a completely perfect design.