Project 2
Library Database Management System

Team 1

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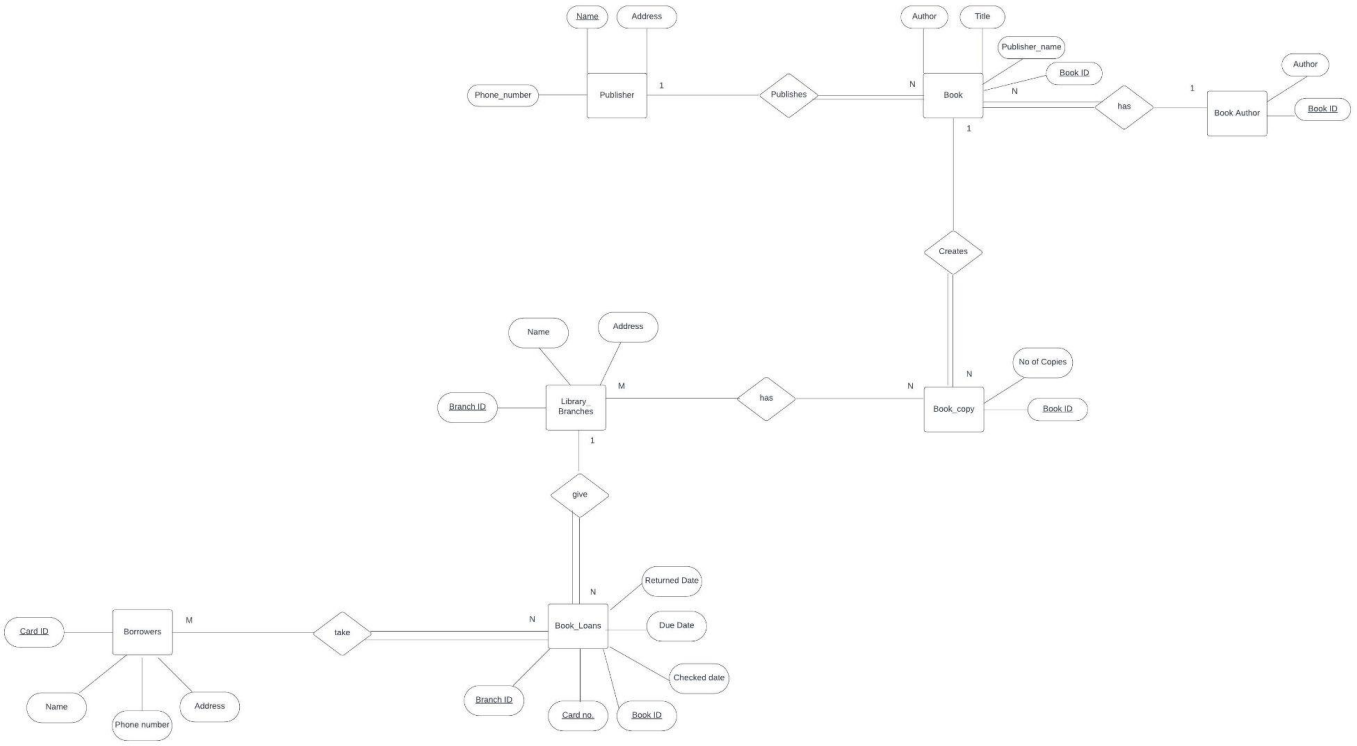
Introduction

Our database for a library management system is designed to organize and process libraries and books. Our database comprises two main entities, books and publishers. It starts with the publisher, each one having a unique phone number, name, and address. Each book has a unique ID, title, author, and publisher. There are also other entities including library branches, book copies, book loans, and borrowers. The database finally supports various relationships, ensuring that operations will be effective and readers will have smooth transactions when checking books out.

ER Diagram



Assumptions

- A PUBLISHER publishes many BOOKs, each BOOK is made by one PUBLISHER (1:N relationship)
- A BOOK_COPY is created by one BOOK, each BOOK can have many copies of BOOK_COPY (1:N relationship)
- A BOOK_AUTHOR can make one or many BOOK’s, many BOOK’s can exist by a BOOK_AUTHOR (1:N relationship)

- A LIBRARY_BRANCH has many BOOK_COPY's, each BOOK_COPY can belong to multiple LIBRARY_BRANCH (M:N relationship)
- A BORROWER creates one or many BOOK_LOAN, each BOOK_LOAN can be created by many BORROWER (M:N relationship)
- A LIBARY_BRANCH can have many BOOK_LOAN's, many BOOK_LOAN's can be created for a LIBRARY_BRANCH (1:N relationship)

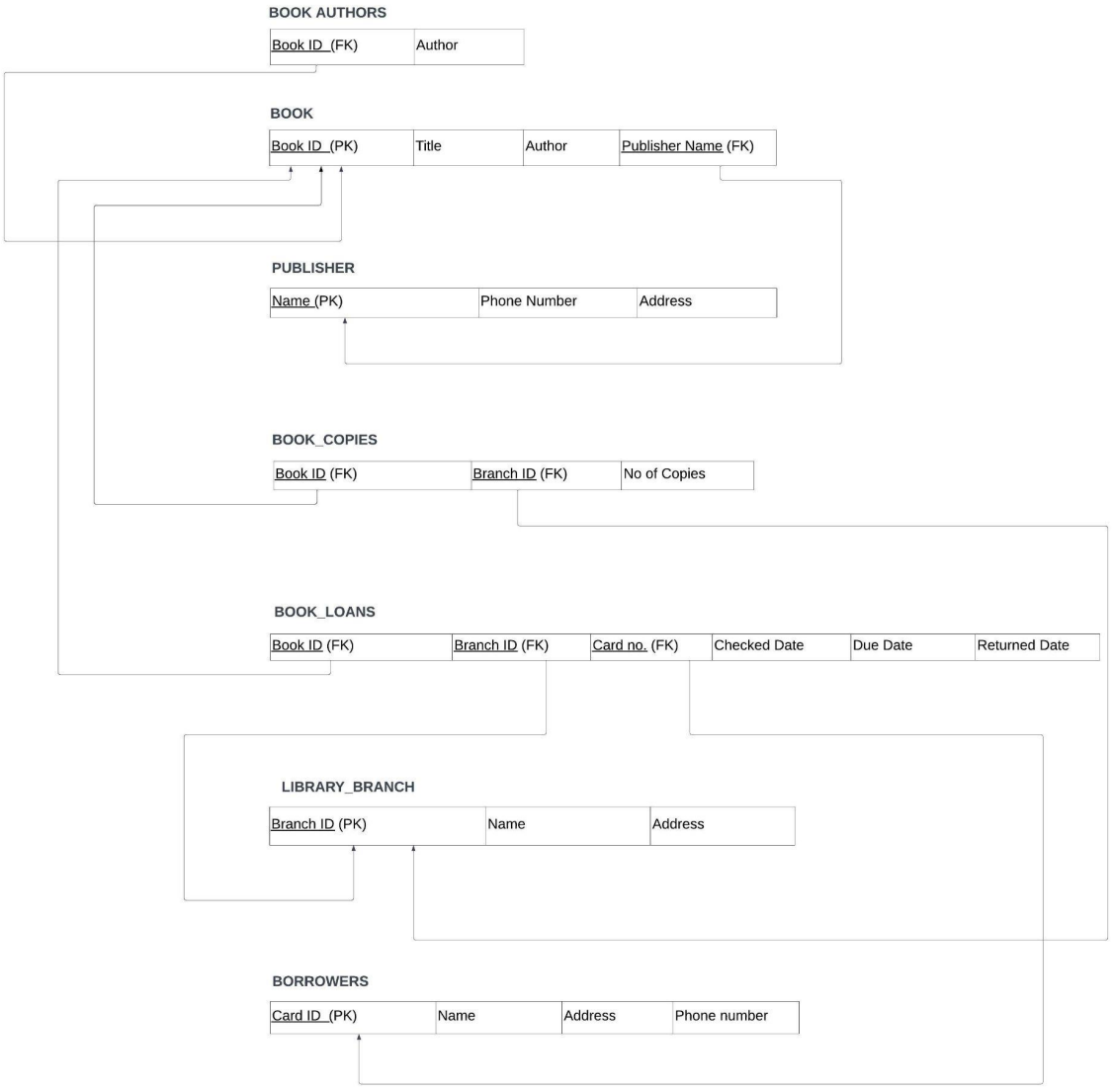
Mini-worlds

- Book: The BOOK entity represents one book that will soon be stored in a library. Each book has a primary key which is the ID number and other attributes that are associated with the book are title, author, and publisher name. Books are then created to become book copies across different library branches, and then borrowers can borrow one or more books.
- Publisher: The PUBLISHER entity represents one or more people involved with publishing books that can be one or more books. Each publisher has a primary key which is the phone number and other attributes that also include their name and address.
- Library branch: The LIBRARY_BRANCH entity represents a physical location where book copies are stored and where borrowers can check them out using book loans. Each library branch has a primary key which is the branch ID and other attributes that have a name and address.
- Book copies: The BOOK_COPY entity represents physical copies of books available at one or more library branches. Each copy has a primary key of ID number and the number of copies. It is associated with a particular book and can allow tracking of how many books are left to be sent to one or more library branches.
- Book loans: The BOOK_LOANS entity keeps track of the borrowing history of one or more books. Each book loan has a primary key of a card number and also has unique attributes such as book ID and branch ID. There are also other attributes such as return date and checked-out date. It creates a relationship between borrowers and library branches.
- Borrower: The BORROWER entity consists of individuals who have library cards and can borrow books. Each borrower has a primary key of a card number and also has a unique attribute of phone number. The borrower also includes attributes such as name and address.

Missing Requirement

- There is no system to record the reserved or unavailable book.
- There is not much information about book authors.

Relational Database Schema



ER to relational mapping

- In the relational schema diagram, the entities are the headers and the attributes are listed in the box for each entity. The unique keys are underlined in the relational schema diagram. The primary keys are denoted by using '(PK)' and foreign keys by '(FK)' symbols. The foreign keys are the unique keys as well that references the attributes from other entities. For example, Book ID is the primary key in a BOOK entity. The same

BOOK ID is in BOOK_COPIES which is referenced from BOOK entity, making BOOK ID in BOOK_COPIES a foreign key.

- The primary keys are BOOK ID, BRANCH ID, and CARD ID from BOOK, LIBRARY_BRANCH, and BORROWERS as these attributes are directly associated with the entities.

- The entities with foreign keys are derived from the entities with primary keys. So, the same attributes that connect these entities were referred as foreign keys, since it references the direct entities. Example: First, there has to be a borrower to get a 'CARD ID' making it a primary key, this gets referenced again in BOOK_LOANS as a foreign key.

Tools

- LucidChart was used to draw ER and schema diagrams.
- Google docs was used for the document.

Contribution List

Hector Trevino - ER Diagram, Document(Assumptions and Explanations)
Kosuke Satake - ER Diagram, Relational Schema Diagram
Muna Bhattarai - ER Diagram, Relational Schema Diagram

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