

Introduction

Project Overview

This project will implement a library database to manage the borrowing of books and other loanable items, as well as the membership of patrons in the library. This database is built to be easily modified and built upon, with multiple different loanable items being easily able to be added. Additionally, the database will allow for numerous queries to manipulate, visualize, and delete the data.

Scope

The project will consist of relations containing books, with numerous attributes; relations containing library patrons, with books they are renting as well as their individual attributes; other loanable items, like movies or music, and their attributes; and library administrators, and their attributes and privileged functions.

Glossary

Query: A request made to the database to generate, update, or delete data from a given relation.

Administrator: Someone with elevated privileges, and is generally responsible for managing the physical library through the database.

Librarian: Someone who helps members borrow/return books, updates member information, and maintains day-to-day services at the library through the database.

Library Member/Patron: A person who goes to the library with the intention of renting a book or other loanable item, who can loan out certain items, and can return those rented items.

Relational Schema Mapping

Relation Name: Book

Origin Entity/Relationship: Book

Relation Schema:

Book(BookID, Title, AuthorID, ISBN, PublicationYear, Genre, Availability, TotalCopies, PublisherID)

Primary Key: BookID

Foreign Key(s): AuthorID references Author, PublisherID references Publisher

Functional Dependencies: N/A

Relation Name: User

Origin Entity/Relationship: User

Relation Schema:

User(UserID, First_Name, Last_Name, DoB, Email, Phone_Number, User_Type, Status, Outstanding_Fees)

Primary Key: UserID

Foreign Key(s): N/A

Functional Dependencies: N/A

Relation Name: Author

Origin Entity/Relationship: Author

Relation Schema:

Author(AuthorID, Name, DoB)

Primary Key: AuthorID

Foreign Key(s): N/A

Functional Dependencies: N/A

Relation Name: Publisher

Origin Entity/Relationship: Publisher

Relation Schema:

Publisher(PublisherID, Name, Location)

Primary Key: PublisherID

Foreign Key(s): N/A

Functional Dependencies: N/A

Relation Name: Loan

Origin Entity/Relationship: Loan

Relation Schema:

Loan(LoanID, UserID, Issued, Due, Returned)

Primary Key: LoanID

Foreign Key(s): UserID references User

Functional Dependencies: N/A

Relation Name: Administrator

Origin Entity/Relationship: Administrator

Relation Schema:

Administrator(AdminID, UserID)

Primary Key: AdminID

Foreign Key(s): UserID references User

Functional Dependencies: N/A

Relation Name: Librarian

Origin Entity/Relationship: Librarian

Relation Schema:

Librarian(LibrarianID, UserID)

Primary Key: LibrarianID

Foreign Key(s): UserID references User

Functional Dependencies: N/A

Relation Name: LoanContains

Origin Entity/Relationship: Loan CONTAINS Book

Relation Schema:

LoanContains(BookID, LoanID)

Primary Key: BookID

Foreign Key(s): BookID references Book, LoanID references Loan

Functional Dependencies: N/A

Relation Name: AddsBook

Origin Entity/Relationship: Administrator ADDS Book

Relation Schema:

AddsBook(BookID, AdminID)

Primary Key: BookID

Foreign Key(s): BookID references Book, AdminID references Administrator

Functional Dependencies: N/A

Relation Name: DeletesBook

Origin Entity/Relationship: Administrator DELETES Book

Relation Schema:

DeletesBook(BookID, AdminID)

Primary Key: BookID

Foreign Key(s): BookID references Book, AdminID references Administrator

Functional Dependencies: N/A

Relation Name: AddsUser

Origin Entity/Relationship: Administrator ADDS User

Relation Schema:

AddsUser(UserID, AdminID)

Primary Key: UserID

Foreign Key(s): UserID references User, AdminID references Administrator

Functional Dependencies: N/A

Relation Name: DeletesUser

Origin Entity/Relationship: Administrator DELETES User

Relation Schema:

DeletesBook(UserID, AdminID)

Primary Key: UserID

Foreign Key(s): UserID references User, AdminID references Administrator

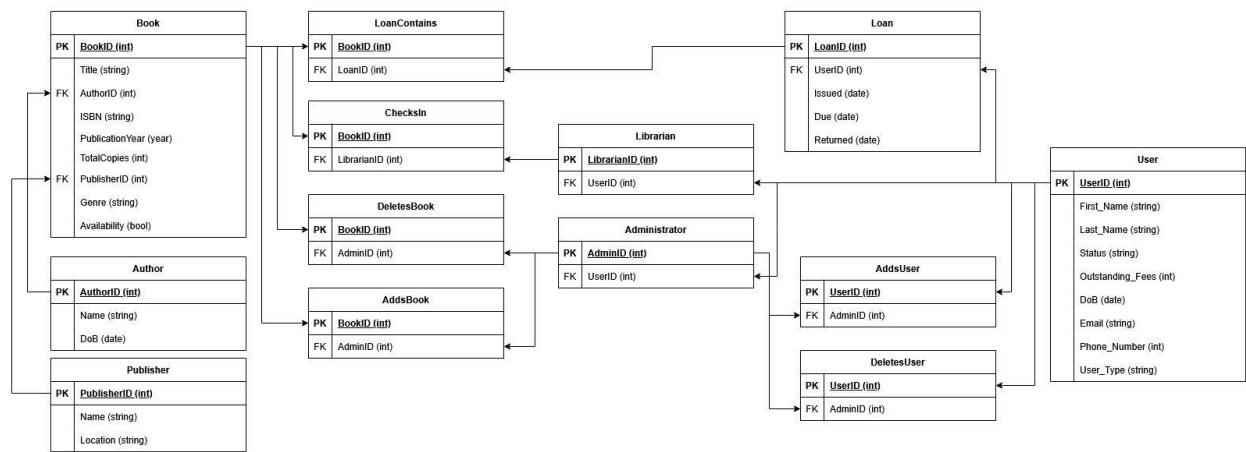
Functional Dependencies: N/A

Relation Name: ChecksIn

Origin Entity/Relationship: Librarian CHECKS IN Book

Relation Schema:
ChecksIn(BookID, LibrarianID)
Primary Key: BookID
Foreign Key(s): BookID references Book, LibrarianID references Librarian
Functional Dependencies: N/A

Relational Schema Diagram



Schema Data Dictionary

| Book | | |
|-----------------|-----------|---|
| Attribute Name | Data Type | Description |
| BookID | INT | The unique ID of the book. PK. |
| Title | VARCHAR | The title of the book. |
| AuthorID | INT | The id of the author of the book. FK in author. |
| ISBN | CHAR(13) | The ISBN of the book. |
| PublicationYear | YEAR | The year the book was published. |
| Genre | VARCHAR | The genre of the book. |
| Availability | BOOLEAN | Whether or not the book is available to loan. |
| TotalCopies | INT | The number of available copies of the book. |
| PublisherID | INT | The id of the publisher of the book. FK in publisher. |

User

| Attribute Name | Data Type | Description |
|------------------|-----------|--|
| UserID | INT | The unique ID of the user. PK. |
| First_Name | VARCHAR | The first name of the user. |
| Last_Name | VARCHAR | The last name of the user. |
| DoB | DATE | The user's date of birth. |
| Email | VARCHAR | The user's email address. Unique. |
| Phone_Number | INT | The user's phone number. |
| User_Type | VARCHAR | The user's type, which defines their privileges. |
| Status | VARCHAR | The user's membership status. |
| Outstanding_Fees | INT | The total sum of outstanding fees. |

Author

| Attribute Name | Data Type | Description |
|----------------|-----------|----------------------------------|
| AuthorID | INT | The unique ID of the author. PK. |
| Name | VARCHAR | The name of the author. |
| DoB | DATE | The author's date of birth. |

Publisher

| Attribute Name | Data Type | Description |
|----------------|-----------|-------------------------------------|
| PublisherID | INT | The unique ID of the publisher. PK. |
| Name | VARCHAR | The name of the publisher. |
| Location | VARCHAR | The publisher's physical location. |

Loan

| Attribute Name | Data Type | Description |
|----------------|-----------|--|
| LoanID | INT | The unique ID of the loan. PK. |
| UserID | INT | The unique ID of the user the loan belongs to. FK in user. |
| Issued | DATE | The date the loan was issued. |

| | | |
|----------|------|---------------------------------|
| Due | DATE | The date the loan is due. |
| Returned | DATE | The date the loan was returned. |

Administrator

| Attribute Name | Data Type | Description |
|----------------|-----------|---|
| AdminID | INT | The unique ID of the administrator. PK. |
| UserID | INT | The unique ID of the user that is an admin. FK in user. |

Librarian

| Attribute Name | Data Type | Description |
|----------------|-----------|--|
| LibrarianID | INT | The unique ID of the librarian. PK. |
| UserID | INT | The unique ID of the user that is a librarian. FK in user. |

LoanContains

| Attribute Name | Data Type | Description |
|----------------|-----------|--|
| BookID | INT | The unique ID of a book. FK in book. PK. |
| LoanID | INT | The ID of a loan. FK in loan. |

AddsBook

| Attribute Name | Data Type | Description |
|----------------|-----------|--|
| BookID | INT | The unique ID of a book. FK in book. PK. |
| AdminID | INT | The ID of an admin. FK in admin. |

DeletesBook

| Attribute Name | Data Type | Description |
|----------------|-----------|--|
| BookID | INT | The unique ID of a book. FK in book. PK. |
| AdminID | INT | The ID of an admin. FK in admin. |

AddsUser

| Attribute Name | Data Type | Description |
|----------------|-----------|-------------|
|----------------|-----------|-------------|

| | | |
|---------|-----|--------------------------------------|
| UserID | INT | The unique ID of a user. FK in user. |
| AdminID | INT | The ID of an admin. FK in admin. |

DeletesUser

| Attribute Name | Data Type | Description |
|----------------|-----------|--|
| UserID | INT | The unique ID of a user. FK in user. PK. |
| AdminID | INT | The ID of an admin. FK in admin. |

ChecksIn

| Attribute Name | Data Type | Description |
|----------------|-----------|--|
| BookID | INT | The unique ID of a book. FK in book. PK. |
| LibrarianID | INT | The ID of a librarian. FK in librarian. |