

447 Project Part 4

1. Introduction

1.1 Project Overview

This database is used in the management of a library system. It will be used by librarians to manage their library and for library members to search for, reserve, renew, return, or check out pieces of media. The system will also be used for fine tracking and management.

1.2 Project Scope

The system needs to be able to allow two main types of users, librarians and users, to perform various actions within the library system. These include checking out, holding, renewing, and returning books. The system needs to keep track of books, digital media and magazines. It also needs to have notification systems in place for reminding members of due dates and reservations. The system must also track checked out media and assign fines to member accounts for overdue media. The members must be able to generate reports about their usage history, and be able to search for specific pieces of media to place a hold or check out that item.

2. Relational Schema Mapping:

2.1 Entity Relations

LIBRARIAN

Attributes:

- LibrarianID (PK) – INT
- Fname – VARCHAR
- Lname – VARCHAR
- Address – VARCHAR
- DOB – DATE
- Salary – INT
- PhoneNumber – VARCHAR
- SSN – INT

Functional Dependencies:

LibrarianID → Fname, Name, Address, DOB, Salary, PhoneNumber, SSN

MEMBER

Attributes:

- MemberID (PK) – INT
- Fname – VARCHAR
- Lname – VARCHAR
- Address – VARCHAR
- DOB – DATE
- OutstandingFees – DECIMAL(6,2)

Functional Dependencies:

MemberID → Fname, Name, Address, DOB, OutstandingFees

MEDIA (*superclass*)

Attributes:

- MediaID (PK) – INT
- PublishDate – DATE
- Title – VARCHAR
- Status – ENUM('available', 'checked_out', 'reserved')
- Genre – VARCHAR

Functional Dependencies:

MediaID → PublishDate, Title, Status, Genre

Subclasses (is_a relationship):

BOOK

Attributes:

- BookID (PK, FK → MEDIA.MediaID)
- Author(s) – VARCHAR
- ISBN – VARCHAR

Functional Dependencies:

BookID → Authors(s), ISBN

MAGAZINE

Attributes:

- MagazineID (PK, FK → MEDIA.MediaID)
- Author(s) – VARCHAR
- ISSN – VARCHAR
- VolumeNumber – INT
- IssueNumber – INT

Functional Dependencies:

MagazineID → Author(s), ISSN, VolumeNumber, IssueNumber

DVD

Attributes:

- DVDID (PK, FK → MEDIA.MediaID)
- Creator(s) – VARCHAR
- ISBN – VARCHAR
- Rating – VARCHAR

Functional Dependencies:

DVDID → Creator(s), ISSN, ISBN, Rating

2.2 Relationship Relations

MANAGES

Between **LIBRARIAN (1..*)** and **MEMBER (0..*)**

Relation: MANAGES(LibrarianID, MemberID)

Primary Key: (LibrarianID, MemberID)

Foreign Keys:

- LibrarianID → LIBRARIAN(LibrarianID)
- MemberID → MEMBER(MemberID)

Functional Dependencies:

(LibrarianID, MemberID) → LibrarianID, MemberID

MANAGE

Between **LIBRARIAN (1..*)** and **MEDIA (0..*)**

Relation: MANAGE(LibrarianID, MediaID)

Primary Key: (LibrarianID, MediaID)

Foreign Keys:

- LibrarianID → LIBRARIAN(LibrarianID)
- MediaID → MEDIA(MediaID)

Functional Dependencies:

(LibrarianID, MediaID) → LibrarianID, MediaID

RESERVES

Between **MEMBER (1..*)** and **MEDIA (0..*)**

Relation: RESERVES(MemberID, MediaID)

Primary Key: (MemberID, MediaID)

Foreign Keys:

- MemberID → MEMBER(MemberID)
- MediaID → MEDIA(MediaID)

Functional Dependencies:

(MemberID, MediaID) → MemberID, MediaID

LOAN (*Associative Entity for Checks Out / Has*)

Between **MEMBER (1..1)** and **MEDIA (1..1)**

Attributes:

- MemberID (PK, FK → MEMBER.MemberID)
- MediaID (PK, FK → MEDIA.MediaID)
- CheckoutDate – DATE
- ReturnDate – DATE
- Overdue – BOOLEAN
- Fee – DECIMAL(6,2)

Functional Dependencies:

(MemberID, MediaID) → CheckoutDate, ReturnDate, Overdue, Fee

3. Relational Schema Diagram:

Included in the ~/Deliverables/part4 directory of the GitHub repository:

<https://github.com/B3rt577/Library-Database-System>

4. Data Dictionary:

4.1 Entity Relations

LIBRARIAN

Attribute Name	Date Type	Description
LibrarianID	INT	Unique identifier for each librarian
Fname	VARCHAR	Librarian's first name
Lname	VARCHAR	Librarian's last name
Address	VARCHAR	Librarian's address
DOB	DATE	Librarian's date of birth
Salary	INT	Librarian's salary
PhoneNumber	VARCHAR	Librarian's contact number
SSN	INT	Social security number

MEMBER

Attribute Name	Date Type	Description
MemberID	INT	Unique identifier for each library member
Fname	VARCHAR	Member's first name
Lname	VARCHAR	Member's last name
Address	VARCHAR	Member's address
DOB	DATE	Member's date of birth
OutstandingFees	DECIMAL(6,2)	Amount owed by the member

MEDIA (superclass)

Attribute Name	Date Type	Description
MediaID	INT	Unique identifier for each media item
PublishDate	DATE	Data when the media was published
Title	VARCHAR	Title of the media item
Status	ENUM('available', 'checked_out', 'reserved')	Availability status
Genre	VARCHAR	Category or genre of the media

Subclasses (is_a relationship):

BOOK

Attribute Name	Date Type	Description
BookID	INT	Unique identifier for each book
Author(s)	VARCHAR	Author(s) of the book
ISBN	VARCHAR	International standard book number

MAGAZINE

Attribute Name	Date Type	Description
MagazineID	INT	Unique identifier for each magazine
Author(s)	VARCHAR	author(s) of the magazine article
ISSN	VARCHAR	International standard serial number
VolumeNumber	INT	Volume number of the magazine
IssueNumber	INT	Issue number within the volume

DVD

Attribute Name	Date Type	Description
DVDID	INT	Unique identifier for each DVD
Creator(s)	VARCHAR	creator(s) or director(s)
ISBN	VARCHAR	Optional identifier for DVD
Rating	VARCHAR	Content rating

2.2 Relationship Relations

MANAGES

Attribute Name	Date Type	Description
LibrarianID	INT	ID of the librarian managing the member. Foreign Key to LIBRARIAN(LibrarianID). Composite primary key with MemberID
MemberID	INT	ID of the member being managed by the librarian. Foreign Key to Member(MemberID). Composite primary key with LibrarianID

MANAGE

Attribute Name	Date Type	Description
LibrarianID	INT	ID of librarian managing the media. Foreign Key to LIBRARIAN(LibrarianID). Composite primary key with MediaID
MediaID	INT	ID of media being managed by the librarian. Foreign Key to Media(MediaID). Composite primary key with LibrarianID

RESERVES

Attribute Name	Date Type	Description
MemberID	INT	ID of member reserving the media. Foreign Key to Member(MemberID). Composite primary key with MedialID
MedialID	INT	ID of media being reserved the member. Foreign Key to Media(MedialID). Composite primary key with MemberID

LOAN

Attribute Name	Date Type	Description
MemberID	INT	ID of member borrowing the media. Foreign Key to Member(MemberID). Composite primary key with MedialID
MedialID	INT	ID of media item being loaned by the member. Foreign Key to Media(MedialID). Composite primary key with MemberID
CheckoutDate	Date	Date when the media was checked out
ReturnDate	Date	Date the media must be returned
Overdue	BOOLEAN	Indicates whether or not the media is overdue
Fee	DECIMAL(6,2)	Value of the fee charged on an overdue loan