
Library Management System - Project Part C: Conceptual Modeling

EECS447: Database Systems

Team Name: ASYNCLIB
Team Members: Nick, Ashton, Cole, Sean, Yadhunath

Professor: Hossein Saiedian
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Revisions

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Version	Date	Author	Description
1.6	10/01/25	Nick, Ashton, Cole, Sean, Yadhunath	Made the initial draft, assigned roles, created the document template.
1.7	10/03/25	Nick, Ashton, Cole, Sean, Yadhunath	Worked on finalizing the Conceptual model and performed final clean-up for submission.

Project Overview:

This Library Management System (LMS) project aims to efficiently manage extensive book information, memberships, clientele, profiles, and accounts. Its database consolidates a vast amount of data, presenting it through an intuitive and easily navigable interface for user convenience.

Scope:

- This project focuses on developing a comprehensive resource management system for books and magazines. It will store key details such as title, author, ISBN/issue number, publication date, genre, and availability.

- Additionally, the system will feature a client and membership management component. This will include unique IDs, contact information, various membership categories (regular, student, senior), and defined borrowing restrictions.

- A tracking system will be implemented to manage borrowed, returned, and reserved media. This system will record timestamps, client details, and enforce rules regarding borrowing limits and late return fees.

- Finally, a user interface will be developed to enable staff to efficiently manage operations. This includes checking out and returning items, adding new resources, managing client accounts, calculating fines, and viewing both resource availability and client profiles.

Glossary

- **Primary Key**: A candidate key that is chosen by the database designer to uniquely identify each tuple in a relation. It is a minimal superkey, meaning it uniquely identifies a tuple but no proper subset of its attributes can uniquely identify a tuple.
- **Foreign Key:** A foreign key is a field (or collection of fields) in one table that uniquely identifies a row of another table.
- **Relationship:** An association between two or more entities or tables in a database that represents how these entities are connected.

Identify Entities

- Clients
- Membership Types
- Items: *Is a major entity which would be containing information of different items such as Books, Magazines, and Media.*
    - Magazines
    - Books
    - Media

Define Attributes

Clients:

- ***Clid:*** Unique id to identify client
- ***Name:*** Name of client
- ***Phone:*** Phone number of client
- ***Email:*** Email of client
- ***member type:*** Status of client
- ***account status:*** Status of account(active or inactive)

Membership Types:

- ***checkout length:*** Checkout time length
- ***late fee rate:*** Rate of feet(dependant on membership type)
- ***borrowing limit:*** Limit of the amount of items a client can have
- ***member type:*** Member type of client
- ***Member_type_id:*** Unique ID of clients membership type

Items:

- ***Publisher****:* Publisher of the item
- ***Item_id****:* Unique id for the item
- ***Type****:* Type of the item (book, magazines, or media)
- ***Title****:* Title of the item
- ***Availability****:* If the item is available to borrow
- ***publication date:*** Date of publication for the item

Books:

- ***Genre****:* Genre of the book
- ***Item_id****:* Unique id of the book
- ***author name****:* Name of the author
    - ***author first****:* First name of author
    - ***author last****:* Last name of author
- ***ISBN****:* Identifying number of a book

Magazines:

- ***Item_id****:* Unique ID of the magazine
- ***issue number****:* Issue number of the magazine

Media:

- ***Item_id****:* Unique ID of the media
- ***director name****:* Director's name
    - ***director first****:* Director's first name
    - ***director last****:* Director's last name

Reservations:

- ***date of Reservation****:* Date of item reservation
- ***reserved by****:* Client id of reserver

Borrowed by:

- ***borrowed by****:* Client id of borrower
- ***checkout date****:* Date of item checkout

Define Relationships

Reserved:

- *Attributes: Client, item*
- *Multiplicity: A client can have 0 or more reservations on their account with no limit. An item can be reserved by 0 or more people with no limit*

Borrowed:

- *Attributes: Client, item*
- *Multiplicity: A client can borrow anywhere from 0 to their borrowing limit of books. A book can only be borrowed by 0 or 1 clients*

Account Type:

- *Attributes: Client, membership*

- *Multiplicity: A client has exactly one membership type. A membership type can be applied to 0 or more clients with no limit*