Library Database Management System Requirements

1. Introduction

Project Overview

The Library Database Management System (LDBMS) is developed to increase the productivity and organization of library management. The system will manage book and digital media management, membership management, borrowing processes, and reporting. By implementing a structured and automated process, the LDBMS will improve user experience, reduce administrative tasks, and ensure accurate record-keeping, providing a more accessible and easier-to-use library system.

Scope

The LDBMS will cover:

- Management of library inventory, including books, digital media, and magazines.
- Tracking of client memberships, borrowing limits, and fees.
- Implementation of borrowing, returning, and reservation functionalities.
- Generation of various reports related to borrowing trends, overdue items, and revenue collection.

Glossary

- **LDBMS**: Library Management System
- **ISBN**: International Standard Book Number
- **UUID**: Universally unique identifier
- **Client**: A registered library member
- **Items**: Books, digital media, and magazines available for borrowing
- **Books and digital media** have the same attributes/ similar attributes
- **Digital media** can be music CDs, audio books, movies, video games, and shows

2. Stakeholders

- **Library Admin/Staff**: Responsible for managing items and handling client accounts.
- **Clients (Library Members)**: End-users who borrow items, reserve items, track fees, browse, and manage their accounts.
- **Administrators**: Oversee the database, manage system configurations, and ensure security and performance.

3. Requirements

Functional Requirements

- **Constraints**:
    - Each client can borrow a maximum number of items at a time, depending on their membership type.
        - Standard Member: up to 5 items
        - Student Member: up to 7 items
        - Senior Member: up to 3 items
    - Each client can borrow an item for a maximum time before incurring late fees, depending on their membership type.
        - Standard Member: 2 weeks
        - Student Member: 1 month
        - Senior Member: 3 weeks
    - Certain items (e.g., rare books or latest issues of magazines) may have borrowing restrictions which take precedence over membership type if membership maximum borrow time is greater than borrow time.
        - Rare: 2 weeks
        - Latest issues: 3 weeks
        - High demand: 2 weeks
    - Each client can renew a borrowed item for any number of times, given the item has no reservations
    - Fees are incurred for late returns, with different rates based on the membership type.
        - Standard Member: $0.30 per item per day
        - Student Member: $0.15 per item per day
        - Senior Member: $0.10 per item per day
    - Each client can place a reservation on any number of items at a time
- **User Administration**: Library staff can create, update, and delete client accounts.
- **Transaction Management**: The system tracks books, magazines, and digital media, including availability status.
- **Borrowing and Returning**: Clients can borrow and return items, with due dates en available reserved books.
- **Fee Management**: Automatic calculation of late fees based on membership type.
- **Report Generation**:
    - List of available books by genre.
    - Borrowing trends by genre and author.
    - Overdue items and responsible clients.
    - Monthly revenue summary from fines.
    - Most borrowed items and frequent borrowers.

Data Entities

Entity	Attributes
Client	ID (Primary Key), Name, Phone Number, Membership Type, Account Status
Library Admin	ID (Primary Key), Name, Phone Number, Account Status
Users	Username (Primary Key), Role, Password, Deleted
Book	ISBN (Primary Key), Title, Author, Publication Year, Genre, Rarity, Availability Status
Digital Media	ID (Primary Key), Title, Type, Creator, Genre, Rarity, Availability Status
Magazine	ID (Primary Key), Title, Issue Number, Publication Date, Latest, Availability Status
Borrowing	Transaction ID (Primary Key), Client ID (Foreign Key), Item ID (Foreign Key), Borrow Date, Due Date, Return Date
Reservation	Reservation ID (Primary Key), Client ID (Foreign Key), Item ID (Foreign Key), Reservation Date
Fees	Fee ID (Primary Key), Client ID (Foreign Key), Amount, Due Date, Payment Status

Relationships

- Book, Digital Media, and Magazine **Is a** Item
- Client and Library Admin **Is a** User
- Client **Borrow** Item
- Client **Return** Item
- Client **Reserve** Item
- Client **Browse** Item
- Library Admin **Manages** Item
- Library Admin **Manage** Client

Non-Functional Requirements (Optional)

- **Performance**: The system should handle up to 100 concurrent users.
- **Security**: Only authorized staff can modify inventory or manage client accounts.
- **Compliance**: Adheres to data privacy policies regarding client information.

4. Hardware and Software Requirements

- **Hardware**: The database will be hosted in the cloud server via Supabase
- **Software**:
    - **Database Management System**: PostgreSQL via Supabase
    - **Development Tools**: SQL for database queries, Next.js for front-end interfaces.

5. Appendices

For our front end, we will use next.js. The front end will give administrators access to process returns, manage items, and manage clients. On the client side, the clients can browse the items, reserve items, and check fees and loan status.

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