Project Part 2: Database Requirements

Project Overview: Library Management System

Introduction:
Project Overview: The system will manage a diverse collection of loanable items, track various types of memberships, enforce borrowing rules, and generate meaningful reports.
Scope Statement: From the project overview: This project aims to provide hands-on experience in designing, implementing, and managing a relational database system for a small library. The system will manage a diverse collection of loanable items, track various types of memberships, enforce borrowing rules, and generate meaningful reports.
Glossary: None

Stakeholders:

1. Library Staff

Responsible for day-to-day library operations such as item checkouts, returns, client management, and fee collection. They need access to reports and queries for decision-making and tracking overdue items.

2. Library Clients

These are regular patrons who borrow items from the library. They use the system to search the catalog, reserve items, check loan status, and manage outstanding fees.

3. University Administration

The university oversees the management of the library and requires regular reports on library operations, including inventory usage, financial reports, and membership activity.

4. System Administrators

They manage the database infrastructure, ensuring data integrity, backups, and user roles. They are responsible for enforcing system security and managing access rights based on user roles.

5. IT Support Team

Handles the technical support for the Library Management System, including software updates, maintenance, and resolving any technical issues encountered by users.

Requirements:

Non-Functional Requirements:

Performance metrics - Do not exceed 3 seconds for data retrieval

Security requirements - Ensure data can not be retrieved from unauthorized users.

Compliances with regulations - Ensure information about clients is private

Functional Requirements:

- List all currently available books and digital media.
- Find the total number of items loaned out by each membership type.
- Retrieve a list of all overdue items and the associated late fees.
- Determine which items are reserved but not yet loaned out.
- Identify the most popular items by the number of loans.
- Generate a report of total fees collected within the last month, broken down by membership type.
- Produce a list of clients who have exceeded their borrowing limits.
- Determine the most frequently borrowed items by each client type.
- Find out which clients have never returned an item late.
- Calculate the average time an item stays on loan before being returned.
- Report Generation:
    - Monthly Summary Report:
        - Generate a report summarizing the total number of items loaned, total fees collected, total reservations that are made, number of new clients and most popular items for the month.
        - Breakdown the statistics by client type and item category (Books, Digital Media, Magazines).
    - Client Activity Report:
        - Produce an individual report for each client showing their borrowing history, outstanding fees, and any reserved items.
        - Statistics about the number of new clients.
    - Inventory Report:
        - List all items, their current availability status, and their last borrowed date.
        - Highlight items that have not been borrowed in the past six months.
        - List of new and latest collections.
    - Overdue Items Report:

    - Generate a report listing all overdue items, the client responsible, and the calculated late fees.
    - List of clients that have overdue items along with a number of overdue items.

- Financial Report:
    - Summarize the library's revenue from fees, showing the breakdown by membership type and item category.

Data Requirements:
Here's a draft of the Data Entities section for your Library Management System project, outlining key entities, attributes, data types, and constraints:

1. Book
Represents physical books available for loan.

- ItemID ((Primary Key) – INT, Auto-increment: Unique identifier for each book.
- Title – VARCHAR(255): Title of the book.
- Author/Creator – VARCHAR(255): Name of the book's author or creator.
- ISBN – VARCHAR(13): International Standard Book Number, must be unique.
- PublicationYear – YEAR: The year the book was published.
- Genre – VARCHAR(100): The genre of the book (e.g., Fiction, Non-fiction).
- AvailabilityStatus – BOOLEAN: Indicates whether the book is available (TRUE) or loaned out (FALSE).

2. Digital Media
Represents digital media available for loan, such as eBooks or audiobooks.

- ItemID (Primary Key) – INT, Auto-increment: Unique identifier for each digital media item.
- Title – VARCHAR(255): Title of the digital media.
- Author/Creator – VARCHAR(255): The name of the creator or author of the digital media.
- ISBN – VARCHAR(13): Identifier for the media item, where applicable.

- PublicationYear – YEAR: The year the digital media was published or released.
- Genre – VARCHAR(100): The category of digital media.
- AvailabilityStatus – BOOLEAN: Indicates availability (TRUE for available, FALSE for checked out).

3. Magazine
Represents magazines in the library.

- ItemID (Primary Key) – INT, Auto-increment: Unique identifier for each magazine.
- Title – VARCHAR(255): Title of the magazine.
- IssueNumber – VARCHAR(50): Issue number or volume of the magazine.
- PublicationDate – DATE: Date the magazine was published.
- AvailabilityStatus – BOOLEAN: Indicates if the magazine is available for loan (TRUE = available, FALSE = checked out).

4. Client
Represents library users who can borrow items.

- ClientID (Primary Key) – INT, Auto-increment: Unique identifier for each client.
- Name – VARCHAR(255): Full name of the client.
- ContactInformation – VARCHAR(255): Contact information (phone or email).
- MembershipType – VARCHAR(50): Type of membership (e.g., Regular, Student, Senior Citizen).
- AccountStatus – VARCHAR(20): Status of the client account (e.g., Active, Suspended, Closed).

5. Loan
Represents the loaning of items from the library to clients.

- LoanID (Primary Key) – INT, Auto-increment: Unique identifier for each loan transaction.
- ClientID (Foreign Key) – INT: Links to the client who is borrowing the item.
- ItemID (Foreign Key) – INT: Links to the item (book, digital media, magazine) being borrowed.
- LoanDate – DATE: The date the item was borrowed.

- DueDate – DATE: The date the item is due to be returned.
- ReturnDate – DATE, Nullable: The actual return date of the item (if returned).
- LateFee – DECIMAL(5,2), Nullable: The fee incurred if the item is returned late.

6. Reservation
Represents reservations made by clients for items in the library.

- ReservationID (Primary Key) – INT, Auto-increment: Unique identifier for each reservation.
- ClientID (Foreign Key) – INT: Links to the client making the reservation.
- ItemID (Foreign Key) – INT: Links to the reserved item (book, digital media, magazine).
- ReservationDate – DATE: The date when the reservation was made.
- ReservationDueDate – DATE: The date by which the item must be picked up or the reservation will expire.

User Requirements:

1. Library Staff:
    - Access level: Admin
    - Functions:
        - Check out items
        - Process returns
        - Add new items to inventory
        - Generate reports
        - Manage client accounts
    - Interface requirements:
        - Interface access to checkout returns and inventory management
        - Alerts for overdue items
        - Search tool for items and clients
2. Library Clients:
    - Access level: Standard user
    - Functions:
        - Search the catalog
        - Reserve items
        - View outstanding fees
    - Interface requirements:
        - Search interface with filters by category and availability
        - Personal account page showing history and fees

3. University Administration:
    - Access Level: Administrative User
    - Functions:
        - Search the library catalog and reserve items
        - Check loan status and view borrowing history
        - Manage outstanding fees
        - Receive notifications about due dates
    - Interface requirements:
        - Access to high-level dashboards
        - Detailed reporting tools for financial summaries
4. System Administrators:
    - Access level: Super Admin
    - Functions:
        - Manage database infrastructure ensuring integrity and security
        - Control user roles and permissions across the system
        - Perform system maintenance
    - Interface requirements:
        - Administrative dashboard for permission management
        - Access to system logs for troubleshooting and monitoring
        - Tools for implementing software updates
5. IT Support Team:
    - Access level: Support user
    - Functions:
        - Provide technical assistance and resolve user issues
        - Monitor system performance and implement software updates
        - Collaborate with system admins for system maintenance
    - Interface requirements:
        - Access to technical documentation and troubleshooting guides
        - Monitoring tools for system health and user activity
        - Communication tools for reporting issues and updates

Hardware and Software Requirements:
For this project, we will be using MySQL on a Windows 11 laptop. The laptop expects a minimum of 1 CPU core, 256 MB of RAM, and 100 MB of disk space.