1. **Title**: Library Management System

2. **X-Team Number:**
   Team 211

3. **Team Members:** include the names and netid@wisc.edu of each xteam member.

   Jennifer Park: jpark536@wisc.edu
   Xiaoxi Sun: xsun279@wisc.edu
   Aziz Aldharrab: aldharrab@wisc.edu
   Ismael Jaffri: ijaffri@wisc.edu

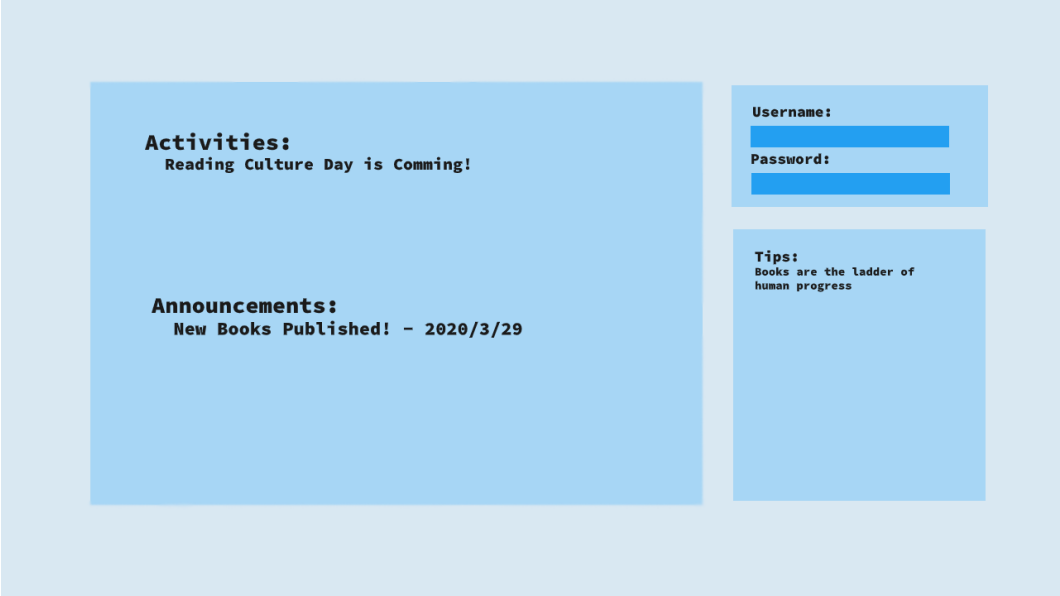
4. **Problem:** What problem does your program solve?
   As the stocks of libraries increase, there is growing need of medium for electronic records such as book IDs, transactions, personnel information, etc. At the same time, there are different roles concerned with libraries. They could be managers who manage the system and the readers who enjoy the services offered by the library. Thus, a GUI based program that can distinguish different users and offer services and functions to different users would satisfy the efficiency need of services and achieve user-friendly interaction.

5. **Primary stakeholder**: Who will be the primary user your program?
   The stakeholders would be the librarians and personnel managers working in library. The staff could utilize this program to provide more efficient services such as borrowing and returning, increasing inventories, addressing staff turnover, etc. The reader would also benefit from such system because they could browse and order books with this program. Stakeholders of the both parties would also enjoy a faster searching experience.

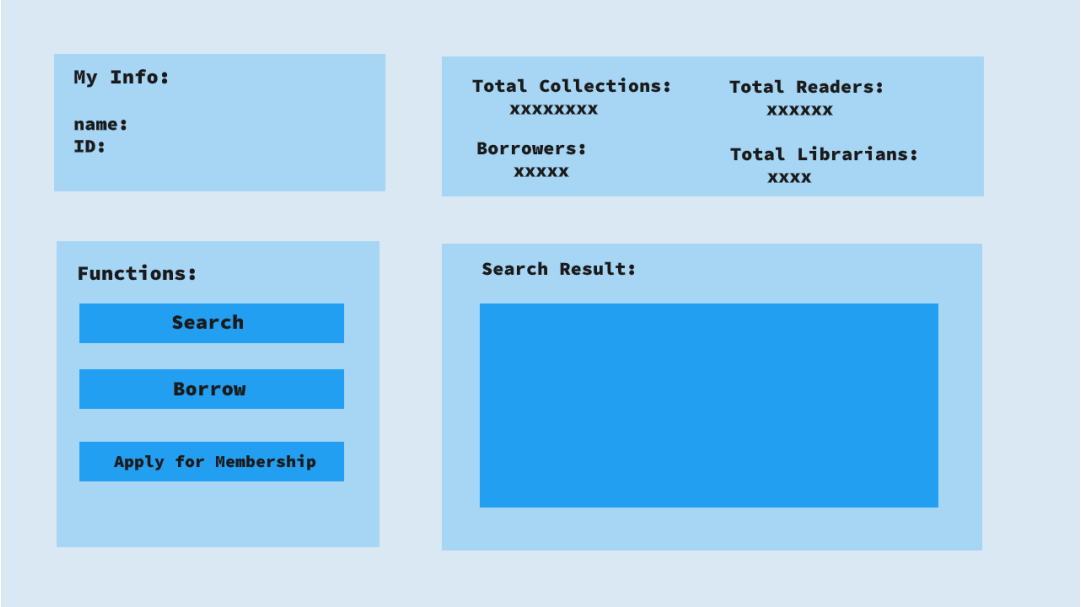
6. **Graphical User interface**: Revise and update the sketches of the user interface screens, menus, and options.

These are only for demonstration. Colors, titles are subjected to modification

Login Menu:



Readers' interface:



7. **Data Structure**: What type of ADT or data structures will be needed and used by your program?

1) Managers

Abstract data type: list

Data structure: BST, linked list or array list. Or the mixture of both linked list and array list.
Explanation: Since the number of managers would probably not too large, it is possible to maintain personnel information with an array list or a linked list.

2) Readers

Abstract data type: list

Data structure:

Mixture of linked list and array list. Use linked list as a pre-classified data structure, which store different readers based on their initials or their ID number, etc.

Explanation: Potentially there could be a great number of readers, storing their information after preprocessing or under certain patterns would facilitate operations conducted later.

3) Collections:

Abstract data type: list

Data structure: B or B + tree to frequently add, delete, search, and change the records of books.
Explanation: The number of records of books, magazines, etc. would also be large. So using B or B+ tree is under the consideration of efficiency.

4) Transactions:

Abstract data type: list

Data structure: Linked list + array list

Explanation: Storing the transactions happened in the library, borrowings and lendings, for example.

8. **Input Data File Format:** Provide a sample input data file for each type of data needed by your program.

1) Managers: CSV or JSON

CSV:

Name, ID, Username, Password, Borrowings, Title

(Or the corresponding JSON format)

Note: Title could be director, staff, etc.

2) Readers: CSV or JSON

CSV:

Name, ID, Username, Password, Borrowings, Membership, Credit evaluation

(Or the corresponding JSON format)

Note: Membership could be general reader or member. Credit evaluation varies from person to person. This could be affected by borrowing, returning, and default.

3) Collections: CSV or JSON

CSV:

Collection Name, Collection ID, Collection type, Total number, Remaining number,

(Or the corresponding JSON format)

4) Transactions: CSV or JSON

CSV:

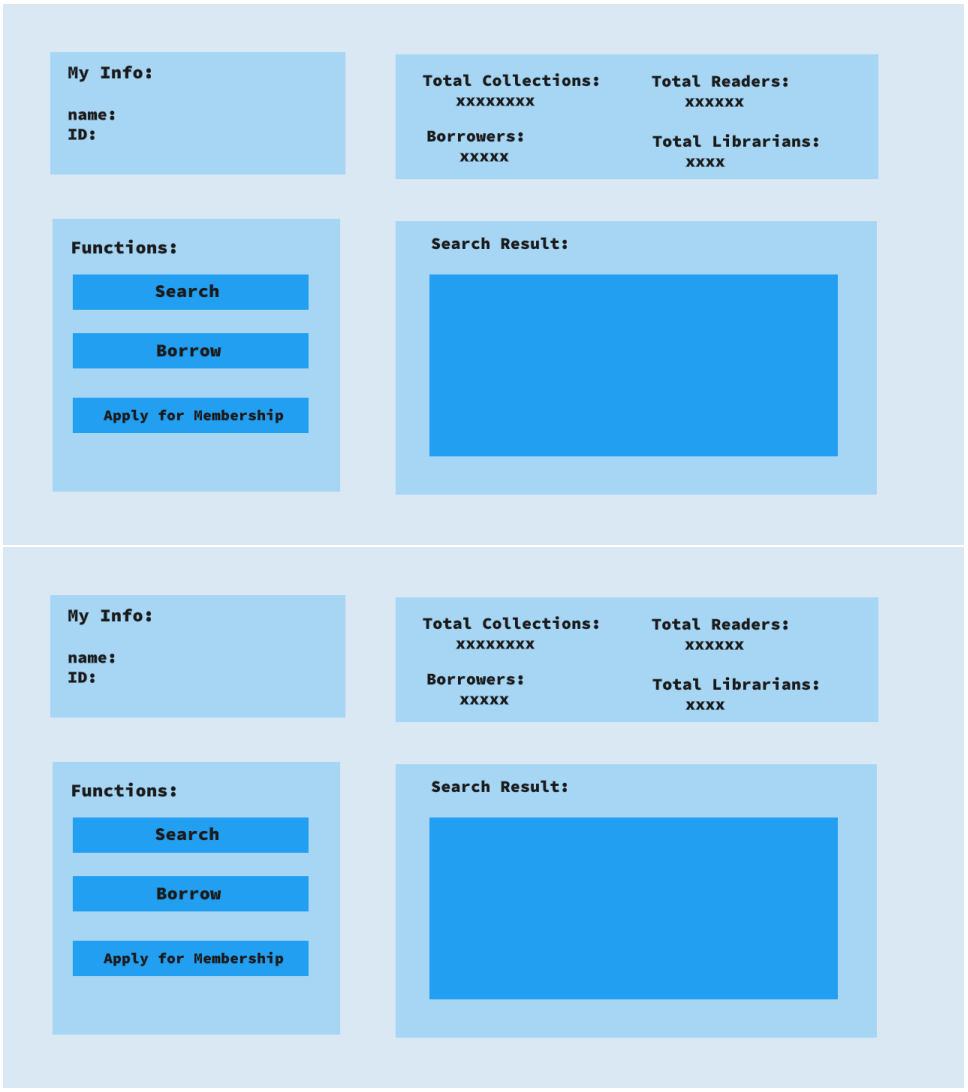
Transaction Type, Transaction ID, Transaction Time, [People involved in the transactions]

(Or the corresponding JSON format)

Note: This class could also be extended to specify different types of transactions because different transactions (e.g. borrowing, lending, buying, giving) have different attributes and operations.

9. **Output Example:** Provide an example image of the output possible from the program. This example may be drawn or created using any word or image editor program of your choice.

This shows search result after a user search. The result would be shown on the right bottom block.



10. **Milestones:** Describe discrete points or independent units, where parts of the project's functionality can be completed and can be tested or demonstrated independently of the final overall program. Organize or order your milestones so that you can complete the most independent parts first, and then build on those working parts or prototypes.

    Units: Interface, Class Implementations, People Managers (responsible for managing Librarians and readers), Collections Managers (responsible for managing Collection records)

    So the first part would be discuss the details of different units and specify the corresponding interfaces. The second part would be building on the working parts to form a prototype.

11. **Assign tasks:** List the tasks for each milestone and assign members or pairs of your team to each task. Be sure to assign multiple members to the more challenging and less understood problems your project will need to solve.

    ISMAEL: Interface Implementation

    XIAOXI: People's Manager Implementation

    AZIZ: Class Implementation

    JENNIFER: Collections Manager Implementation

Adrian: Library management system

This library management system maintains basic operations in a library. There are two types of users, Readers and Librarians. Readers could borrow and search for some books, browse related news (published by the librarians). While the librarians have more power, they could do everything a reader can do and add, remove books, authorize a new reader, publish news about the library, etc. The data structures used for storing records of books, people, and transactions (recording borrowing and returning) could be chosen from B-trees, linked lists, hash table, other balanced search trees. And the GUI would provide a user-friendly platform for both of Readers and Librarians to enjoy the services and administrate the library.