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INFO-C451

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Virtual Library/Library Management System

I. Objectives:

Create a virtual library that will allow users to store, view, add and remove eBooks in a system. The mission of this program is to provide speedy and wide access to update information and save the time of its users or members.

This will provide easy ways for librarians to create and store their library collections. It enables students and staff to communicate and collaborate through multiple channels.

II. System requirements:

- Only authentic user with a valid member card must have the access to the system.
- User must be able to:
    - Search for a book from database
    - Add new book to the database.
    - Update a book's information
    - Rent and return a book
    - See the list of available books from database
- User must enter issue and return date in database.

- Same user ID cannot rent more than 5 books.
- User must sign a "DO NOT COPY DISCLAIMER" consent before checking out.

a. Functional Requirements

No.	Priority Weight (1 to 5)	Description
REQ-1 Add Book	3	This will allow a library staff member to navigate in the system as an Admin and add a new book.
REQ-2 Delete/update book	3	This will allow a library staff member to navigate in the system as an Admin and remove/update a book.
REQ-3 Validate user account	1	when a new member signs up then he should wait for acceptance by Administrator according to library policies.
REQ-4 Delete member	2	Admin can delete a member due to some specific rules.
REQ-5 Login	2	Both Admin and members must be logged in before they modify any information.
REQ-6 Rent book	3	This function will allow an active member of the library to borrow a book.
REQ-7 Return book	3	This function will allow an active member of the library to return a book.
REQ-8 User Search	2	This function will allow you to Search for a book from database.
REQ-9 See list of available books	1	This function will show you a list of books that are available for rent.

b. Nonfunctional Requirements

- Error handling
  - WLMS product shall handle expected and non-expected errors in ways that prevent loss in information and long downtime period.
- Performance Requirements

  - The system shall accommodate high number of books and users without any fault.
  - Responses to view information shall take no longer than 5 seconds to appear on the screen.

- <u>Safety Requirements</u>
  - System use shall not cause any harm to human users.

- <u>Security Requirements</u>
  - System will use secured database
  - Normal users can just read information but they cannot edit or modify anything except their personal and some other information.
  - System will have different types of users and every user has access constraints.

c. <u>User Interface Requirements</u>

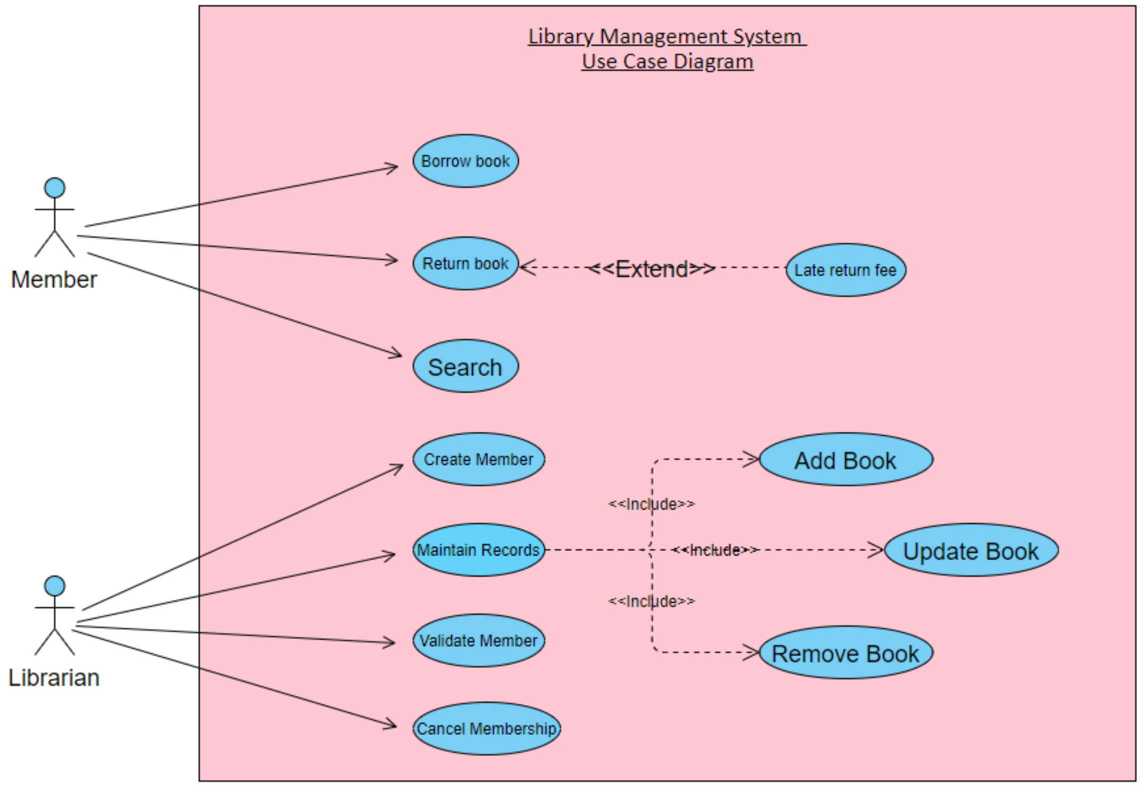
- <u>Library staff member/Librarian Model</u>
  1. Login Page: Librarian model also has a login page in which he or she has to add their authorized ID in order to make the interface accessible.
  2. Books List: Librarian has to understand what books are available in the library and which books are issued and which are accessible. It has a detail list of all books that are kept in the library catalog.
  3. Books Issued: Librarian will be directed to another page which can have all the details of the readers who have issued a particular book.
  4. Available Books: There is another list for the books that are available and student can get them issued without going through the period of waiting.

5. Reminder List: This list will keep a check on which students need to be reminded that their date to return the book is upcoming or otherwise they will have to pay a fee.

- <u>Library Member/Student Model User Interface</u>

1. Login Page: The reader has to enter its particular user ID and a keyword as password.
2. Book List: It includes all the available books in the library management system catalog.
3. Checkout Section: This section will display the book you've selected to rent. This will also display how many more books you can borrow or gives you an error when you are over the limit. And inform you about when are the books due for return based on the checkout date.
4. Reminder Section: This section comes with a warning saying and the date on which you have to return a book. This is very useful since it can help you avoid paying fees.

Use Case Diagram:



https://online.visual-paradigm.com/app/diagrams/#diagram:proj=0&type=ClassDiagram&width=11&height=8.5&unit=inch

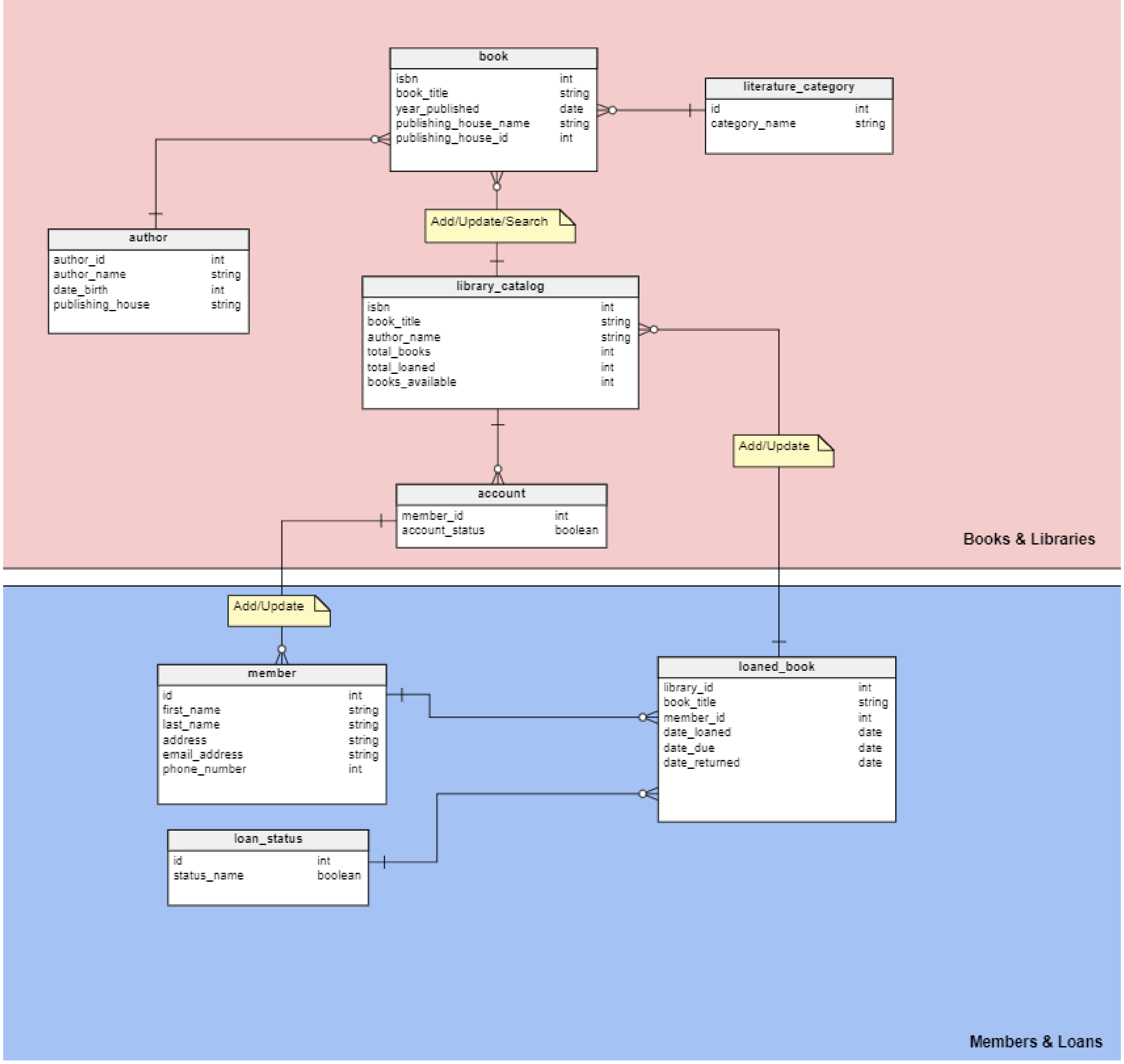
Description:

We have three main actors in our system:

1. Librarian: Mainly responsible for adding and modifying books, and users. The Librarian can also issue, reserve, and return book items as a regular member.
2. Member: All members can search the catalog, as well as check-out, borrow, and return a book.

3. System: Mainly responsible for sending notifications for overdue books, canceled reservations, and late return fee, etc.

Class Diagram / Data Model Structure:



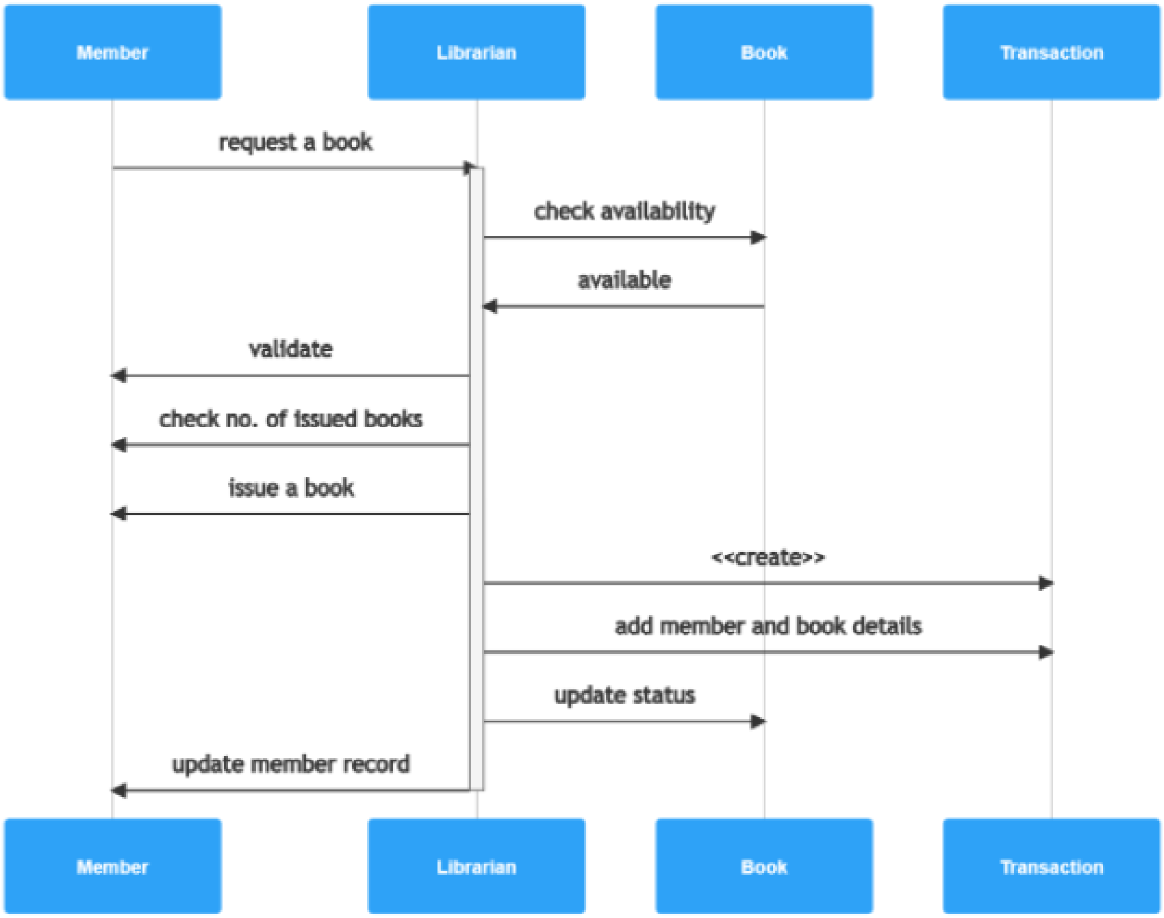
https://my.vertabelo.com/model/fR5CVhbquukPE8Md6jMTFTR1JA7PzJbP

Description:

Here are the main classes of our Library Management System:

- **Library Catalog:** The central part of the organization for which this software has been designed. Catalogs contain list of books sorted on certain criteria. Our system will support searching through four catalogs: Title, Author, Publish-date, and Subject (e.g. literature category).
- **Book:** The basic building block of the system. Every book will have ISBN, Title, Subject, Publishers, etc.
- **Account:** We will have two types of accounts in the system, one will be a general member, and the other will be a librarian. Each member will be issued a library card, which will be used to identify users while issuing or returning books.
- **Loaned Book:** Responsible for managing reservations against book items and manage the checking-out of book items with attributes like library id, isbn, date due, date returned, etc.
- **Author:** This class will encapsulate a book author.
- **Loan Status:** This class will verify if the member is active and has a balance to pay off before borrowing a book.

d. System Sequence Diagram:



https://app.gleek.io/diagrams/gNP8sUvCtvQ5Dx0cbSNQkQ

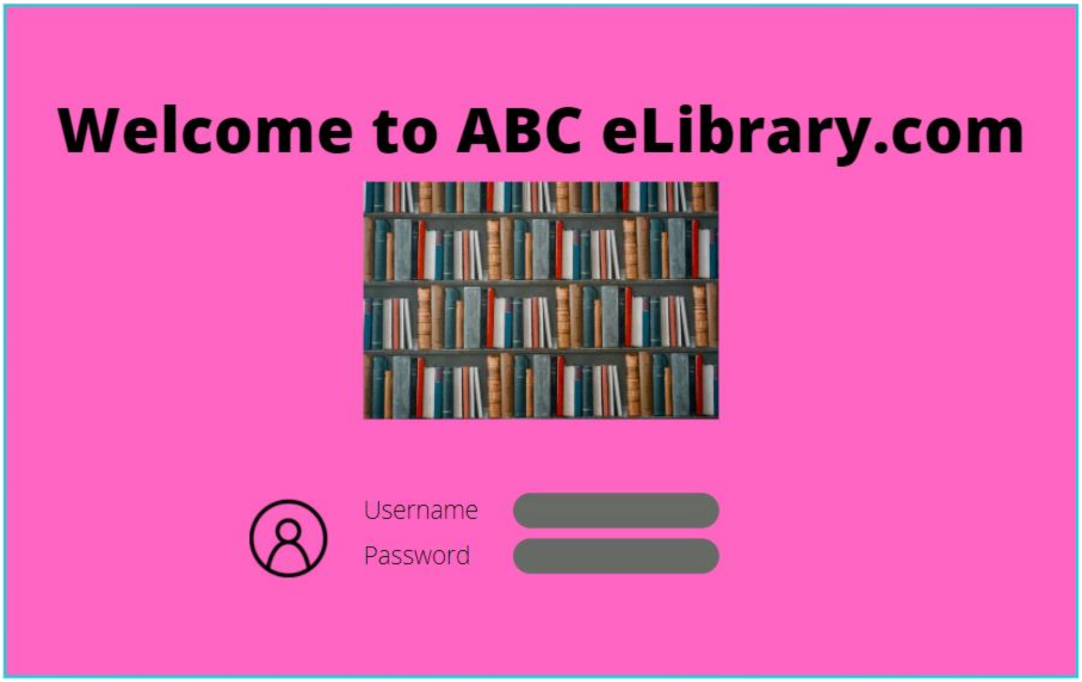
Description:

1. Our first transaction will be launched when a member requests a book from the system thru librarian.
2. Next, the librarian will check the book availability in the system and then the member’s status.

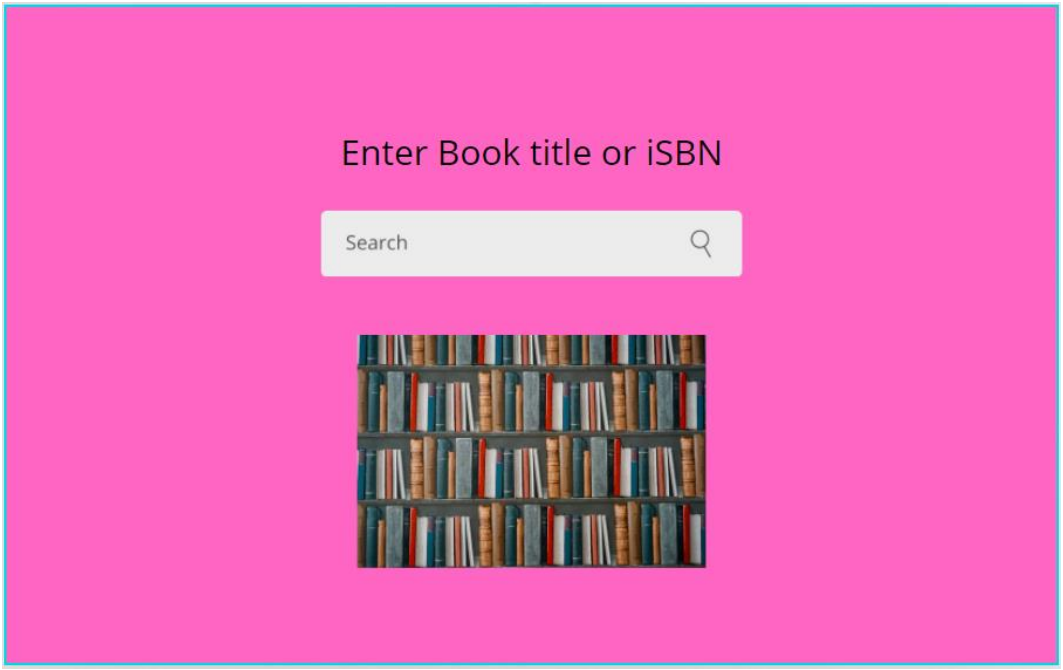
3. If the book is available, the librarian now needs to validate member's request. This is a two-step process of validating membership and also checking the number of books already issued. If the member is authorized to borrow the book, the librarian can now approve the request.
4. The librarian also needs to record the transaction in the library management system, in order to keep our records up-to-date.
5. And finally, the librarian will update the book's status in the system, so it won't be available until returned. The librarian will also need to update the member's record.

e. <u>User Interface Specification:</u>

1. <u>Login</u>

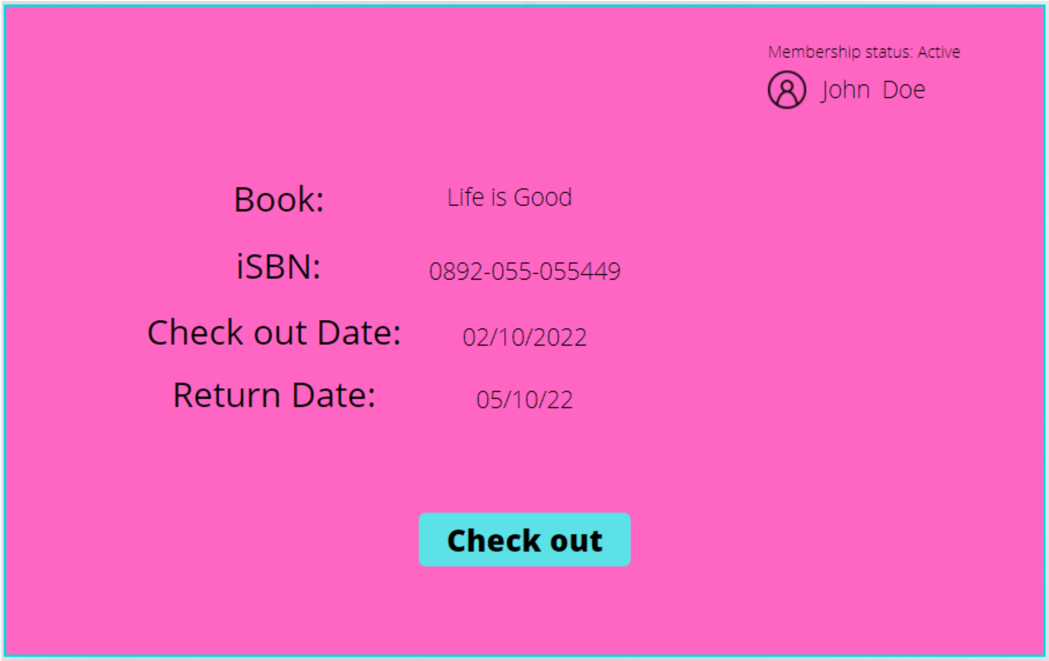


2. Search



Enter Book title or iSBN

3. Check out:



Membership status: Active

John Doe

Book: Life is Good

iSBN: 0892-055-055449

Check out Date: 02/10/2022

Return Date: 05/10/22

https://www.canva.com/design/play?type=TAEdYTQeXq8&category=tAEeXB5DpBM&schema=web-2&locale=en#

f. User Effort Estimation

Based on the prototype we have designed. We can confirm that it will only take about 3 to 4 clicks for a member to borrow a book after login in the system. This is very important for the development of this system. Because it shows how user friendly is the system.

III. Typical customers:

This system will be proposed to public schools and public library in order to facilitate the books renting process for students. This system will be used by students and the library staff. Students are going to be the customers that will rent, return, and browse in the system to find a book in the system.

And the library staff will be the special users that will maintain the database by adding/removing/updating books and create/remove library members (students). This also means that they will need an administrator access that will allow them to have functions listed above than the members.

IV. Customer Problem Statement:

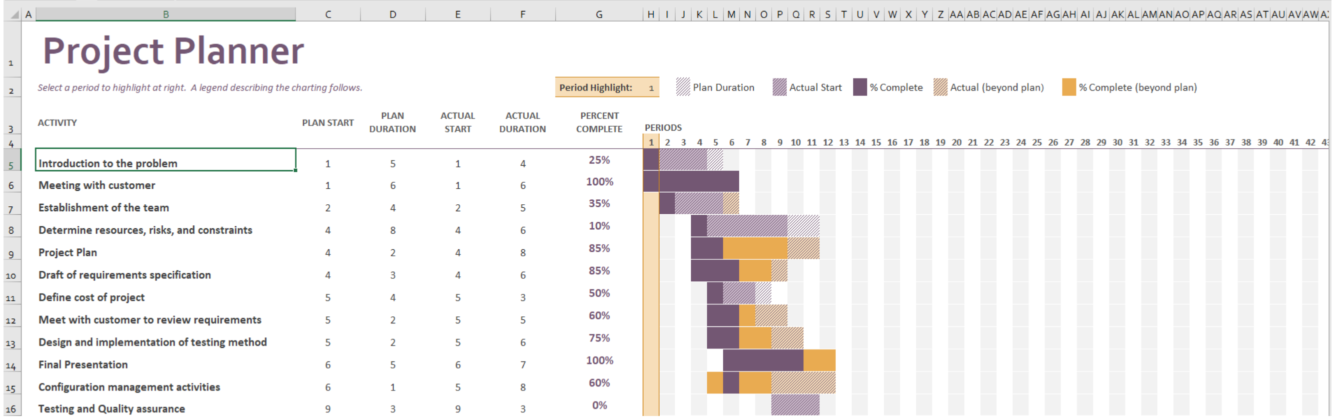
- Libraries are used to store books, but require a system to navigate to a specific book or specific content within a book. A library database system is an infrastructure that allows users to search books and book content, add/remove, and download selected books.
- The problem faced is that library users require an efficient method to find a specific book or keyword(s) within a book given a continuously expanding library. Efficiency requires that the processing time should stay relatively the same even as the library contents increases.

V. Project planning and development approach:

This system will be developed with Visual Studio from Microsoft in .NET, C++ and the support of SQL databases. This will also require a Windows server with all the specific required capacity we will develop later. And a high-speed internet to make it live and accessible through a website as well it is also very important to have one extra server for backup.

VI. Development plan:

Excel sheet



Project Planner

Select a period to highlight at right. A legend describing the charting follows.

Period Highlight: 1 ▨ Plan Duration ▨ Actual Start ■ % Complete ▨ Actual (beyond plan) ■ % Complete (beyond plan)

ACTIVITY	PLAN START	PLAN DURATION	ACTUAL START	ACTUAL DURATION	PERCENT COMPLETE
Introduction to the problem	1	5	1	4	25%
Meeting with customer	1	6	1	6	100%
Establishment of the team	2	4	2	5	35%
Determine resources, risks, and constraints	4	8	4	6	10%
Project Plan	4	2	4	8	85%
Draft of requirements specification	4	3	4	6	85%
Define cost of project	5	4	5	3	50%
Meet with customer to review requirements	5	2	5	5	60%
Design and implementation of testing method	5	2	5	6	75%
Final Presentation	6	5	6	7	100%
Configuration management activities	6	1	5	8	60%
Testing and Quality assurance	9	3	9	3	0%

a. Project size estimation based on use case points

Based on this report, our project doesn’t required a big group of professionals. But we must be sure that the project team consists of the minimum experts and experience professionals, such as:

- Project Manager
- .Net and C++ developer
- SQL developer
- UX/UI designers

- Database Expert
- IT technician

b. Plan of Work:

This group of professionals will basically work on developing the system in a SLDC model stages as shown below.

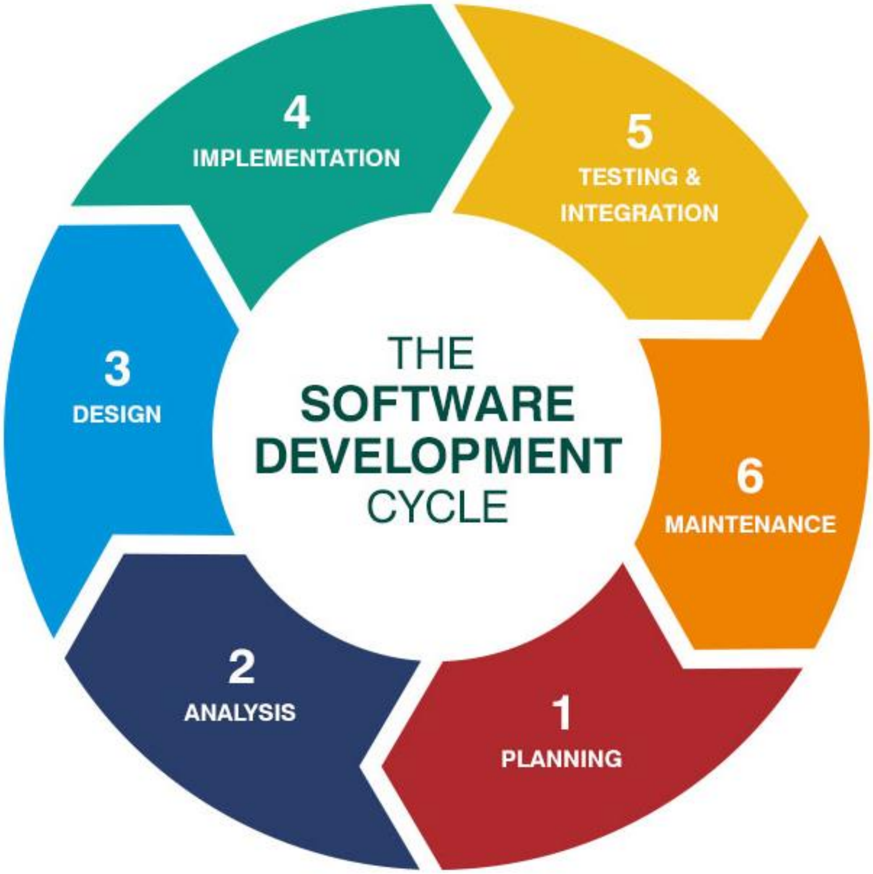


Image from synotive.com

c. Schedule for upcoming weeks:

1st week of March – Review Project

2nd week of March – Make necessary updates

3rd and 4th week of March – Check the coding for project

1st week of April – Work on project UI's prototype

2nd week of April – Work on UI's development

3rd and 4th week – Wrap up project