PROBLEM STATEMENT

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INFO-C 451: System Implementation

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CUSTOMER PROBLEM STATEMENT

PROBLEM STATEMENT

The biggest problem that the community currently faces with the library system is the difficulty in trying to reserve media from the local library. Because the members of the library system use paper cards, the tracking of materials that are checked out, what the library has in inventory, and when items are due back, the library system does not run as seamlessly as it could. There is also no quick way for media to be checked out. Each individual piece of media must be stamped by a member of the staff so there can be long lines when members are trying to check things out. Likewise, with returns, each item must me manually checked back in and then the staff must check to see if someone else is looking to rent that item.

GLOSSARY OF TERMS

Inventory – The list of all items that the library owns.

Media – Anything that a member of the library is able to check out and the library as a whole is able to keep track of.

Members – People that rent media from the library

Member Card – A card assigned to each member of the library in order to keep track of what media has been checked out by this member.

Reserve – How members take out media from the library

Tracking – A way to maintain the inventory of the media that the library has along with currently available and unavailable items

Waitlist – People waiting on media that is not currently available

SYSTEM REQUIREMENTS

FUNCTIONAL REQUIREMENTS

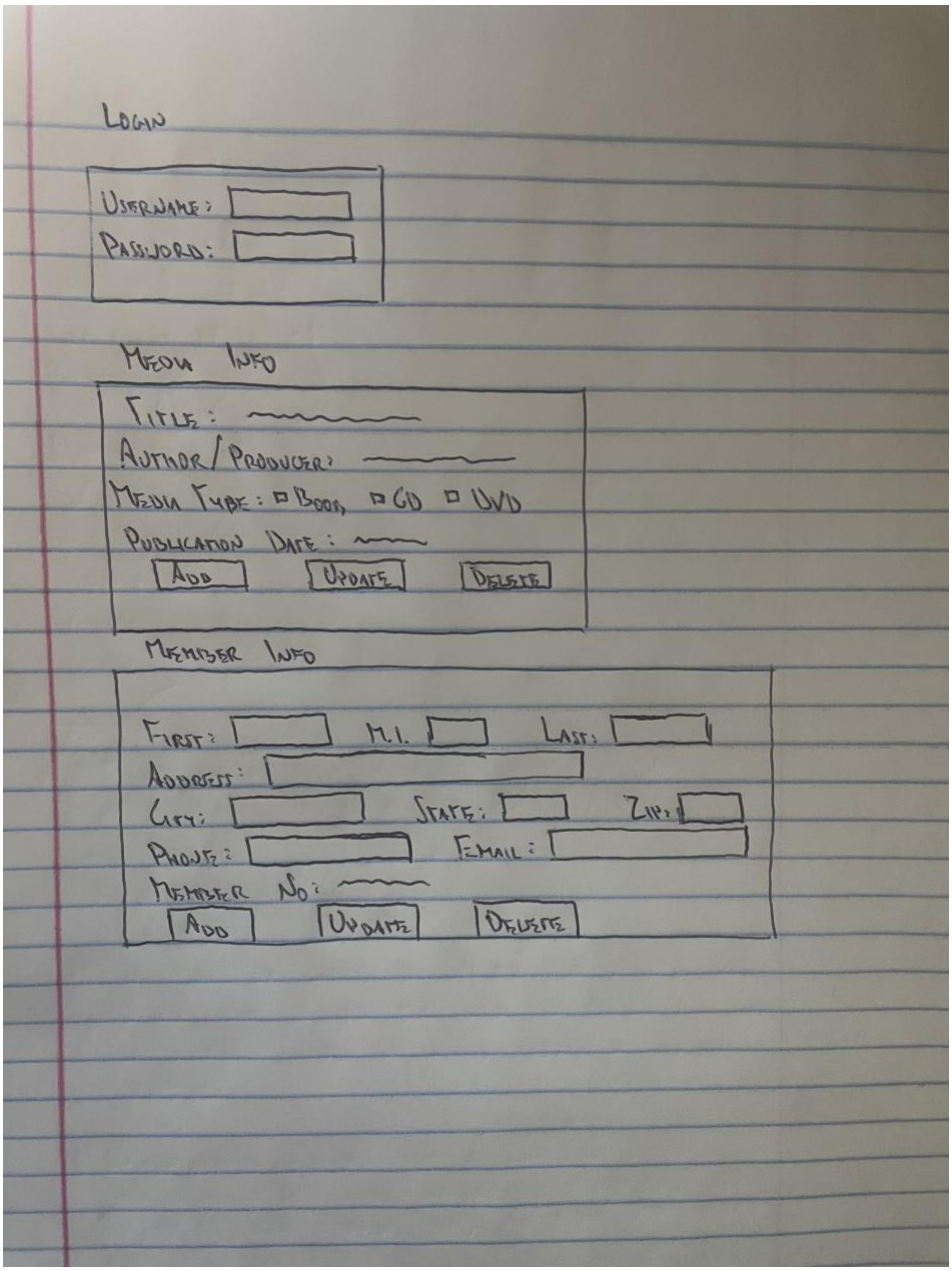
Requirement Number	Priority Weight	Description
REQ-1	High	Reserve Media
REQ-2	High	Track Inventory
REQ-3	High	Checkout Media
REQ-4	High	Add member to list of members
REQ-5	Medium	Check back in Media
REQ-6	Low	Alert members of ready media
REQ-7	Low	Input new inventory

NONFUNCTIONAL REQUIREMENTS

1. Automatically update inventory on daily basis. Priority: High
2. Put hold on member account once late fees reach $20. Priority: High
3. Limit number of times members can consecutively checkout same title.
4. Priority: Medium
5. Automatically calculate overdue charges. Priority: Medium
6. Notify members of late charges once over $1.00. Priority: Low
7. Limit number of characters entered for media search. Priority: Low

USER INTERFACE REQUIREMENTS

Part	Priority	Description
Login	High	Area for username and password
Inventory (Admin)	High	Add/Update/Delete Inventory
Member Screen(Admin)	High	Add/Update/Delete Members
Search Bar	Medium	Search for available media
Media Info Screen	Medium	Show media info and allow for reservation
Member Info Screen	Low	Members able to see account details



The inventory screen and media info screen will be the same except the media info will not have add, update, delete buttons. Likewise, the member screen and member info screen will be the same without these same. buttons.

FUNCTIONAL REQUIREMENTS SPECIFICATION

STAKEHOLDERS

The main stakeholders in this project are going to be the members of the staff along with new and current members of the library. Along with these people, there will also people of the community that may or may not be pleased with the increase in traffic to the library if the expected result in an increase in members happens. There are also members of the community that may be positively affected such as the local schools. The increase in accessibility to more material may create an influx of students using the library system. In the case of the new library management system, the project sponsors could look to an expansion of the system across the area which would in turn create more stakeholders moving forward.

ACTORS AND GOALS

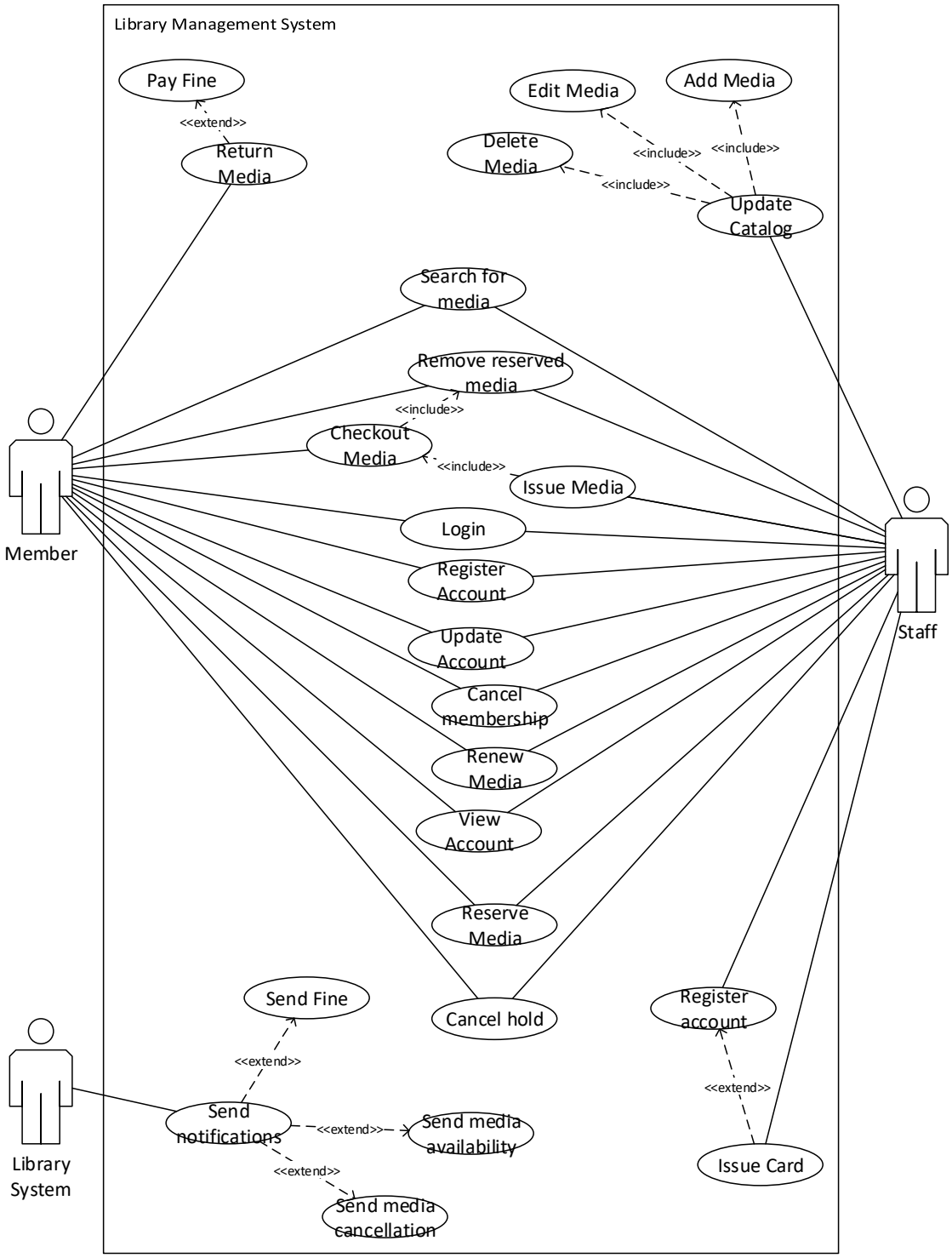
The main actors in the new library system are easily identifiable, the members of the library system and the library staff. The goals of the members of the library are again fairly trivial, checking out media, returning media, searching the library system for media, making any account updates as needed, and paying any fines that may have accrued. The library staff has some similar goals as well, create new accounts, search for media, cancel memberships, and update accounts. Some of the goals of the staff that the members do not have access to is inventory, issuing a library card, and registering an account. The third actor that is not so easy to identify and that is the library system and database itself. The goals of the last actor are things that can be automated through the system itself and do not need a library staff member to do. These tasks include sending out overdue notifications, sending reservation cancellations and availability.

USE CASES

CASUAL DESCRIPTION

The main goals of this system are to be able to create new members, login to your account as a user, reserve and checkout media, update the library catalog and send notifications to members as far as media availability and fines.

USE CASE DIAGRAM



TRACEABILITY MATRIX

Requirements Traceability Matrix

Project Name:	Library Management System	Document Author:	Kevin Wilkosz

Req # Unique ID	Requirement Name / Description	Requested / Approved By:	Priority	User Story or Work Package	Assigned	Test Case Id	Test Case	Current Status
1	Add member	Library Staff / Member	High	Library staff or new user tries to create a new account and are able to if it does not exist.	Kevin Wilkosz	1	Member does not exist	Not Started
					Kevin Wilkosz	2	Member does exist	Not Started
2	Checkout Media	Library Staff / Member	High	Library staff checks out media for member assuming it is available	Kevin Wilkosz	3	Media is available	Not Started
					Kevin Wilkosz	4	Media is unavailable	Not Started
3	Login to the system	Library Staff / Member	High	Login screen allows for staff and members to login	Kevin Wilkosz	5	Member/Staff has valid login credentials	
						6	Member/Staff has invalid login credentials	
4	Reserve Media	Member/Librar y Staff	Medium	Member or staff try to reserve media and check the availability	Kevin Wilkosz	7	Media is available	Not Started
					Kevin Wilkosz	8	Media is not available	Not Started
5	Input Inventory	Library Staff	Medium	Staff inputs new media as it becomes available to the library	Kevin Wilkosz	9	Media does not exist	Not Started
					Kevin Wilkosz	10	Media already in system	Not Started
6	View Account	Library Staff / Member	Medium	Staff and members are able to view acount details if account is active	Kevin Wilkosz	11	Account is active	Not Started
					Kevin Wilkosz	12	Account is inactive or cancelled	Not Started
7	Check in Media	Library Staff	Medium	Upon return of media, staff checks media back in. Stipulations in place if media is not returned	Kevin Wilkosz	13	Member returns on time	Not Started
					Kevin Wilkosz	14	Member does not return in less than 30 days	Not Started
					Kevin Wilkosz	15	Member does not return in over 30 days	Not Started
8	Alert members of requested media availability	Library Staff	Low	Staff alerts members when reserved material becomes available	Kevin Wilkosz	16	Media is available	Not Started
					Kevin Wilkosz	17	Media is available but member does not respond in seven days	Not Started
9	Cancel Membership	Library Staff / Member	Low	Staff or member cancels membership. Members are automatically canceled if inactive for a year	Kevin Wilkosz	18	Member cancels	Not Started
					Kevin Wilkosz	19	Member has been inactive for more than a year	Not Started
10	Renew media	Library Staff / Member	Low	Member or staff rewnew media based on availability and previous renewals	Kevin Wilkosz	20	Member has not renewed yet	Not Started
					Kevin Wilkosz	21	Member has renewed but nobody has requested	Not Started
					Kevin Wilkosz	22	Member has not renewed but another member has requested	Not Started
					Kevin Wilkosz	23	Member has renewed and another member has requested	Not Started
11	Pay Fines	Member	Low	Members are able to pay fines if there are outstanding ones.	Kevin Wilkosz	24	No outstanding fines	Not Started
					Kevin Wilkosz	25	Outstanding fines	Not Started

FULLY-DRESSED DESCRIPTION

From the traceability diagram, the high priority use cases that were identified are the ability to add a member to the database, checkout media from the library, and login to the whole system from the member side or the staff side. Breaking these three use cases down and showing the importance will identify the need for these in the system.

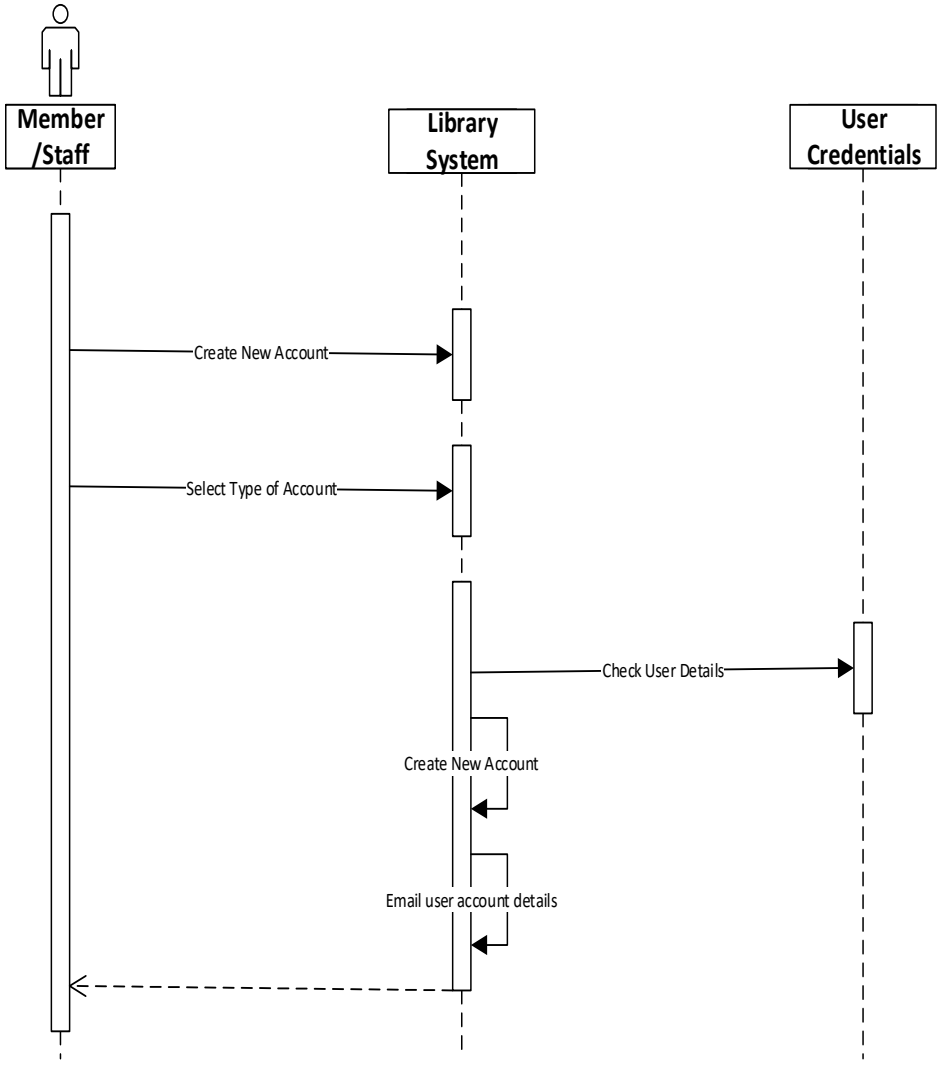
The first one to start with is being able to add a member. The way this use case will work is one of two way, either the member is able to create an account through the library management system or a staff member is able to use the same system. There will be basic requirements, name, telephone number, address, and email address. The new user will also be prompted for a username and password in order to login to the system. There will also be optional aspects to register an account such as space for a payment card that can automatically be charged if the member so chooses, alternate phone numbers, and media preferences. After the member or library staff as entered all of the required information there will be a submit button. If there is no existing user with the same name and address then the account will be created, otherwise the user will be sent to an account retrieval page.

The second use case discussed above is the procedure for checking out media. The way the user will checkout media is by going in to a search screen in the system and searching for the media that they are wishing to checkout. In this screen any search options that match the criteria for that search will show up. This area should show how much inventory there is, how many requests there are for this media if there is none in stock, and a button to checkout the media if there is available inventory. This system will be the same for both the member and the library staff.

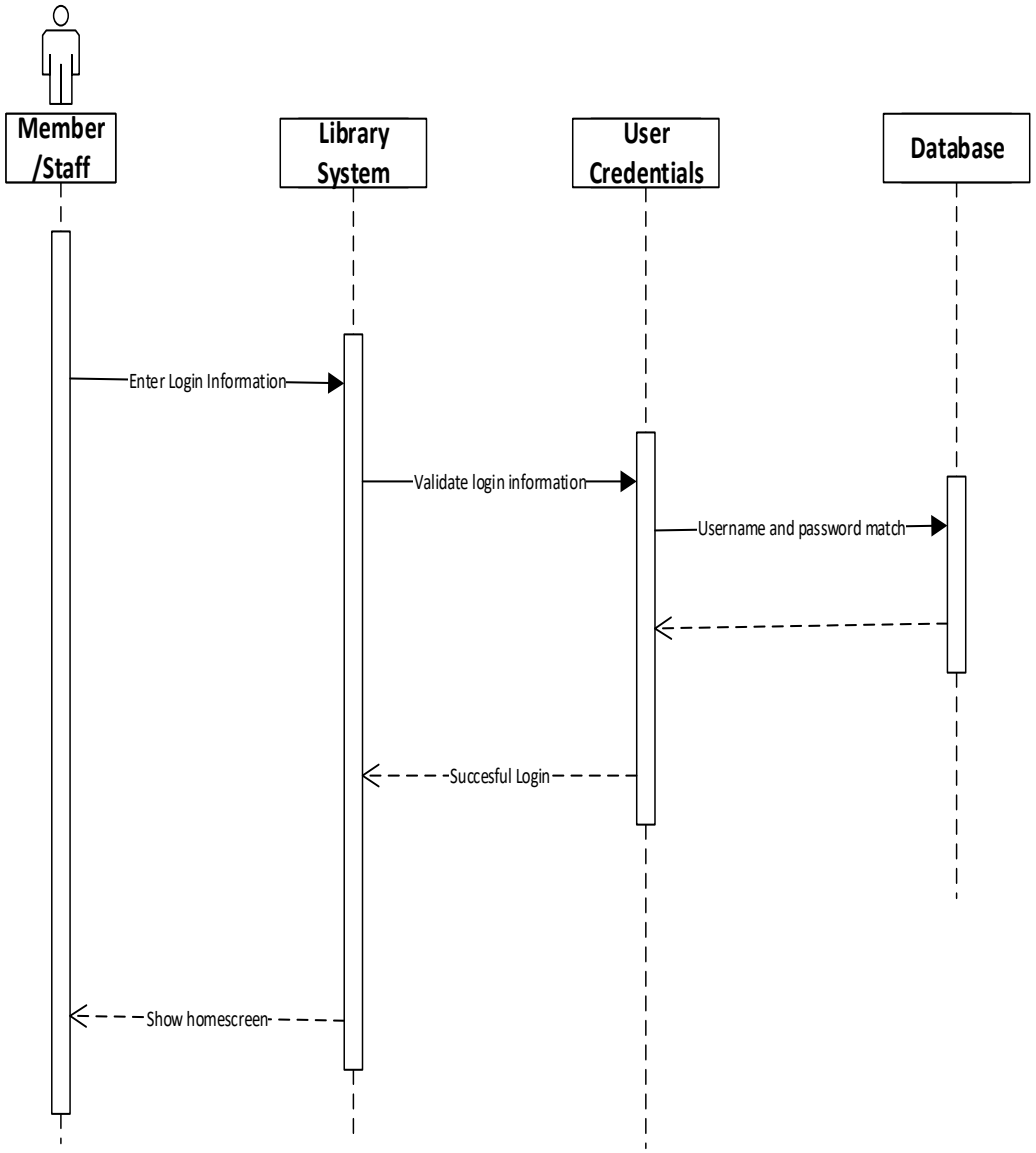
The last case is logging in to the system. On this screen there will be a place for the user to enter a username and password. Once the user has entered a username and password, if the credentials are approved, the main screen for the library system will appear. If the username and/or password does not match the user will be prompted to re-enter or create an account on the off chance the user does not have an active account. If the user knows that an account exists then there will be a password retrieval screen that the user will be directed to.

SYSTEM SEQUENCE DIAGRAMS

New Member Account



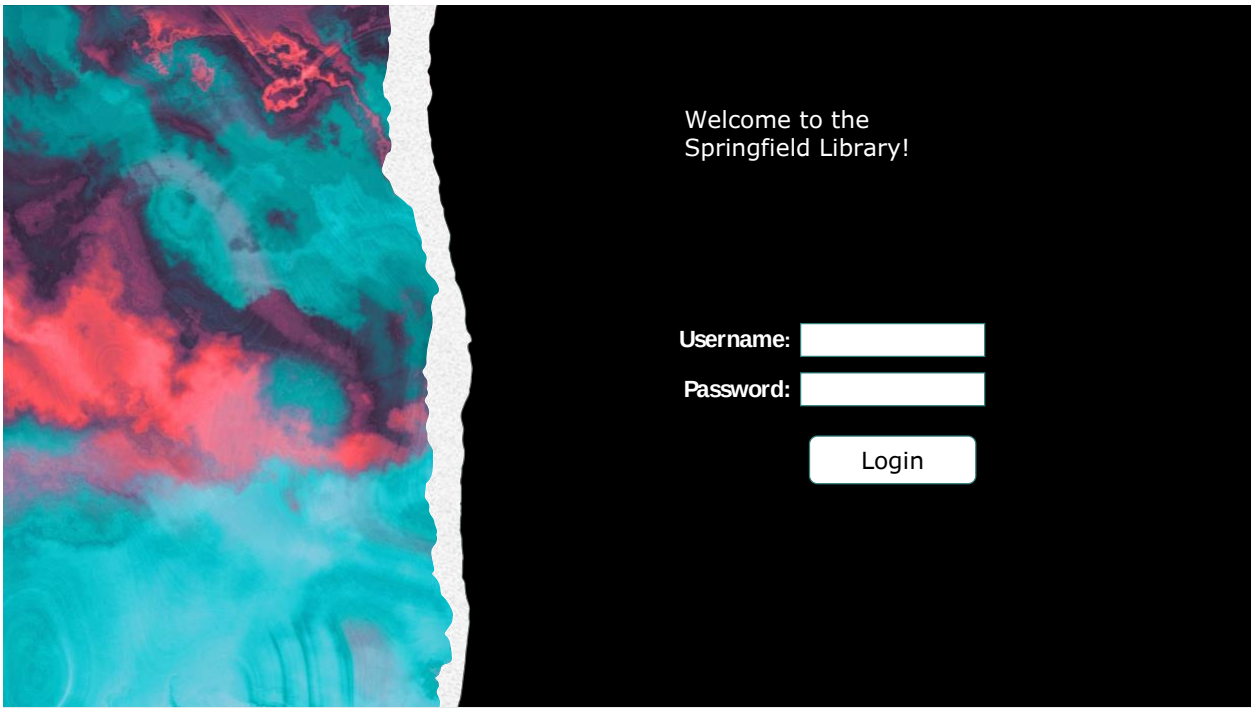
Account Login



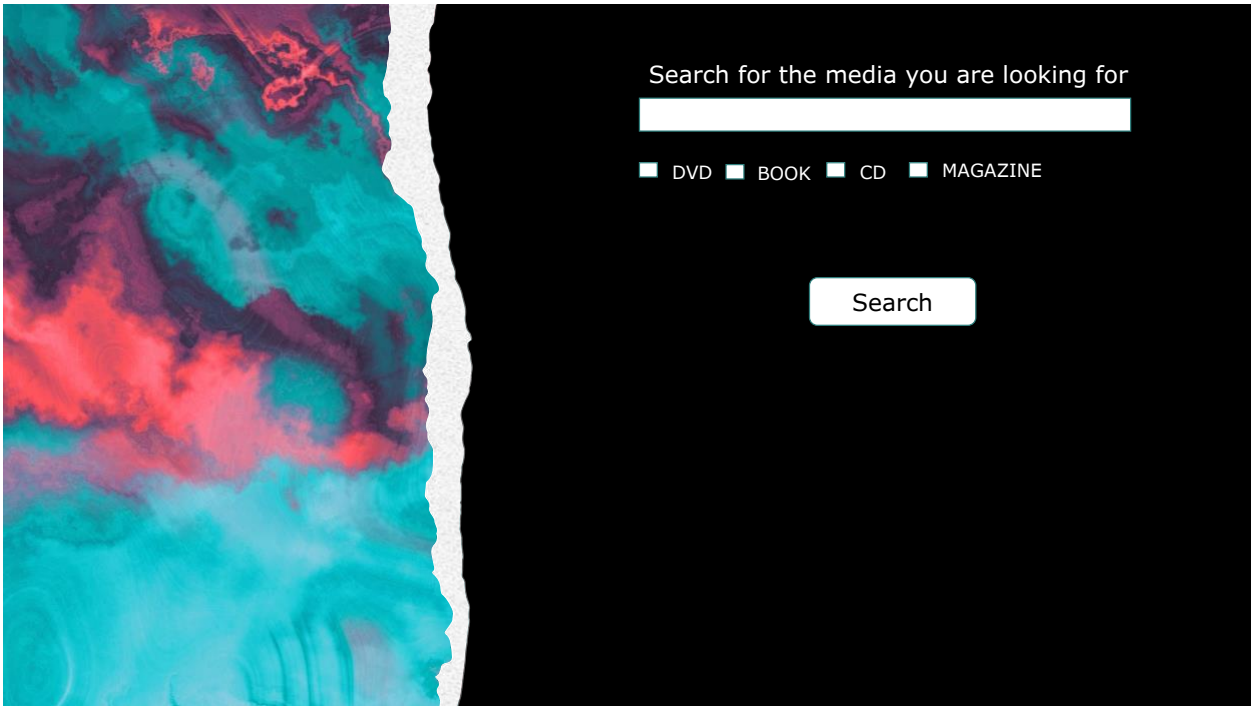
USER INTERFACE SPECIFICATION

PRELIMINARY DESIGN

Login page



Search Screen



Member Registration

USER EFFORT ESTIMATION

For the user registration the first requirement for getting to the registration screen would be to click the create an account button on the login screen. After this the user would need to fill out the above form. Some of this form could be automated Such as auto filling the city and state once the user puts in the address and zip code. The member number would also be auto filled. The number of clicks could be as few as two depending on whether the user uses a tab key to go from box to box or not. Keystrokes will also vary greatly based off the personal user information. Overall, the whole account creation should take no more than two minutes.

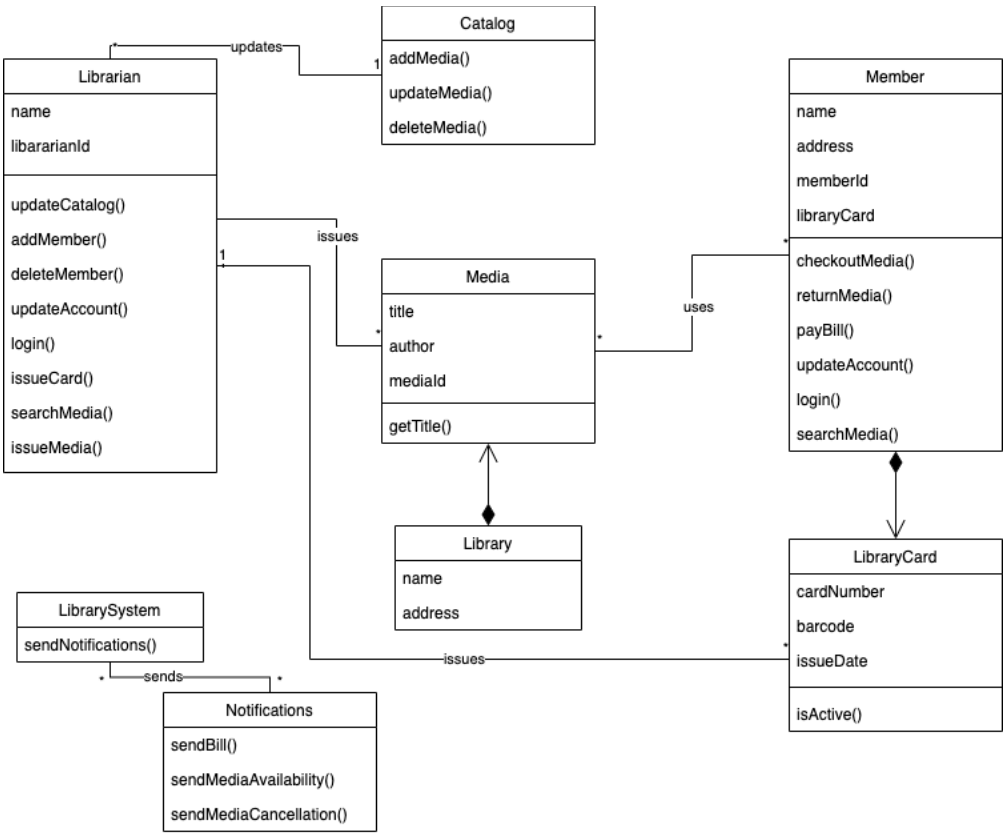
Another user effort estimation would be for the search function in the system. On the main screen of the system there would be a button to jump to the search screen. Once on the search screen keystrokes again wholly depend on what the user is looking for. There would be at most typically two more clicks on this screen, the type of media and the search button. Again, the overall time for this should be around 30 seconds.

For one of the lesser important use cases but one with a more time-consuming navigation through the system would be a member wishing to cancel the account. The user would be prompted to login through

the login page in order to access his or her account. Upon navigating to the account there would be a button at the bottom of the account page to cancel. Upon clicking the cancel button, the user will be asked to verify that this is what they would like to do. After clicking the cancel button, they will be sent to a screen requesting information as to the reason behind canceling. Finally, the user will click submit and a screen confirming the cancellation will be displayed. The total process will take about 2-3 minutes and will require around 5 clicks accessing five different pages.

DOMAIN ANALYSIS

DOMAIN MODEL



CONCEPT DEFINITIONS

The concepts from the domain model shown above are going to be represented by the different classes for this project. The classes for this project are going to be Librarian, Catalog, Member, LibraryCard, Media, Library, LibrarySystem, and Notifications. These classes will help defined the system as a whole and with the domain model show how they will interact with each other.

ASSOCIATION DEFINITIONS

Looking at the domain model the relationships are very clear between the different classes. The Librarian class interacts with three other classes. These classes are the Catalog class, the Media class, and the LibraryCard class. The Librarian classes interaction with the Catalog class is through the updateCatalog() method. This method allows the Librarian class to add, delete, and update media in the Catalog class. The Librarian class also interacts with the Media class through the issueMedia() method. This method allows the librarian to issue media to members. The last class that the Librarian class interacts with is the LibraryCard class with the issueCard() method. The Media class has two other relationship besides with the Librarian class and these are with the Member class and the Library class. These Media class and Member class interact through the checkoutMedia() method found in the Member class. The Media class' interaction with the Library class is a composition relationship. This means that if the library fails to exist so does the media inside the library. The Member class has a composite relationship with the LibraryCard class where if the member exists that LibraryCard fails to function and therefore is deemed useless. The last relationship found in the domain model above is between the LibrarySystem class and the Notifications class. the LibrarySystem uses a method sendNotifications() to send bills, media availability, and media cancellation notifications to members.

ATTRIBUTE DEFINITIONS

Most of the classes listed in the concepts definitions has attributes attached to each of them. The class Catalog class, the LibrarySystem class, and the Notifications class are the exceptions to this. The attributes are as follows for the other classes:

Library

- name
- address

Librarian

- name
- libararianId

Member

- name
- address
- memberId
- libraryCardNumber

Media

- title
- author
- mediaId

LibraryCard

- cardNumber
- barcode
- issueDate

SYSTEM OPERATIONS CONTRACTS

A description of each section in a contract is shown in the following schema.

Operation:	createAccount()
Cross References:	None
Preconditions:	-New user details are entered -New user is not a member already
Postconditions:	-Member has an account created -Member is able to checkout media -Member is able to access library system

Operation:	accountLogin()
Cross References:	None
Preconditions:	-Member exists -Account information is valid -Account has not been inactivated
Postconditions:	-Home screen for library system is displayed

PROJECT SIZE AND ESTIMATION BASED ON USE CASE POINT

Use-Case Complexity	Use-Case Weight	Number of Use-Cases	Product
Simple	5	12	60
Average	10	3	30
Complex	15	1	15
Unadjusted Use-Case Weight (UUCW)			105
Actor Complexity	**Actor Weight**	**Number of Actors**	**Product**
Simple	1	0	0
Average	2	1	2
Complex	3	2	6
Unadjusted Actor Weight (UAW)			8

Factor	Description	Weight	Rated Value (0 to 5)	Factor	
T1	Distributed System	2.0	3	6.0	
T2	Response time or throughput performance objectives	1.0	1	1.0	
T3	End user efficiency	1.0	3	3.0	
T4	Complex internal processing	1.0	1	1.0	
T5	Code must be resusable	1.0	1	1.0	
T6	Easy to install	0.5	3	1.5	
T7	Easy to use	0.5	4	2.0	
T8	Portable	2.0	1	2.0	
T9	Easy to change	1.0	1	1.0	
T10	Concurrent	1.0	1	1.0	
T11	Includes special security objectives	1.0	1	1.0	
T12	Provides direct access for third parties	1.0	2	2.0	
T13	Special user training facilities are required	1.0	1	1.0	
				23.5	
Technical Complexity Factor				0.84	

Factor	Description	Weight	Rated Value (0 to 5)	Impact
E1	Familiar with the project model that is used	1.5	5.0	7.5
E2	Application experience	0.5	5.0	2.5
E3	Object-oriented experience	1.0	4.0	4.0
E4	Lead analyst capability	0.5	4.0	2.0
E5	Motivation	1.0	5.0	5.0
E6	Stable requirements	2.0	4.0	8.0
E7	Part-time staff	-1.0	0.0	0.0
E8	Difficult programming language	-1.0	1.0	-1.0
				28.0
Environmental Factor				0.56
Adjusted Use-Case Points			52.84	

The above use-case point sheet shows how many adjusted use-case points there are for this project. The typical breakdown for use-case points converted to project hours is around 20 to 28 but with the

difficulty of this project it could be safely assumed that the more realistic amount of work hours per use-case point is closer to 5-7 hours. Between the use-case points and the schedule posted in the next section of this report this puts total work time at between 260 and 365 hours for this project. There will be a good majority of things that will be happening concurrently in the development of this project so even though there is allocation for a little over 9 weeks to complete the project, things like design and development will be happening simultaneously. This cuts the project time down significantly as some of these steps have already taken place. The adjusted use-case points is good idea of how much time should be spent to complete from here moving forward and can help greatly with breaking down the project into the tasks listed later on.

PLAN OF WORK

ID	Task Mode	Task Name	Duration	Start	Finish
0		**Software Development**	**62.5 days**	**Fri 2/25/22**	**Tue 5/3/22**
1		**Design**	**5 days**	**Fri 2/25/22**	**Wed 3/2/22**
8		**Development**	**25 days**	**Thu 3/3/22**	**Tue 3/29/22**
15		**Testing**	**14 days**	**Thu 3/24/22**	**Thu 4/7/22**
31		**Training**	**9 days**	**Wed 4/6/22**	**Fri 4/15/22**
40		**Documentation**	**5 days**	**Thu 4/14/22**	**Tue 4/19/22**
47		**Pilot**	**55 days**	**Fri 2/25/22**	**Mon 4/25/22**
53		**Deployment**	**6 days**	**Wed 4/27/22**	**Tue 5/3/22**

Above is the proposed project schedule starting on February 25 through the completion of the project as shown as May3. All these parts of the project have integrated predecessors that have all been checked to ensure that any step that needs to be finished is complete before moving on to the next step. There are four days of buffer in the pilot and in the deployment to ensure that if there are slowdowns anywhere throughout the development of the project there is sufficient time to finish the project by the delivery date. The development of the software and the testing are going to be most of the project time, taking a combined 39 days. In these days, the development of the graphical user interface (GUI), programming the database, and programming the backend to ensure that the users and media can be added to the database properly will be completed. The testing will be run to make sure that there are no bugs with the database or GUI. The training will be a small part of the project at the tail end and will be used as another step-in testing and debugging. Having potential users go through the processes of reserving, canceling, returning, and paying fines will be run. There will also be training for how to updating media in the database along with adding, updating, and deleting members. The milestones that need to be achieved are shown and gives plenty of time to complete the entire project with good documentation and a functional product.

REFERENCES

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