SOFTWARE ENGINEERING LAB REPORT II

LIBRARY BOOK MANAGEMENT APP

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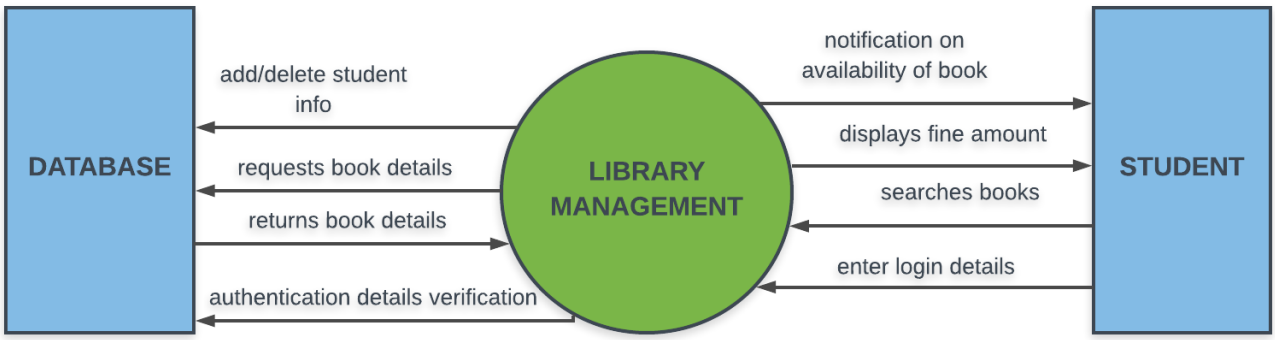
1. Context Diagram

1.1 Context Diagram



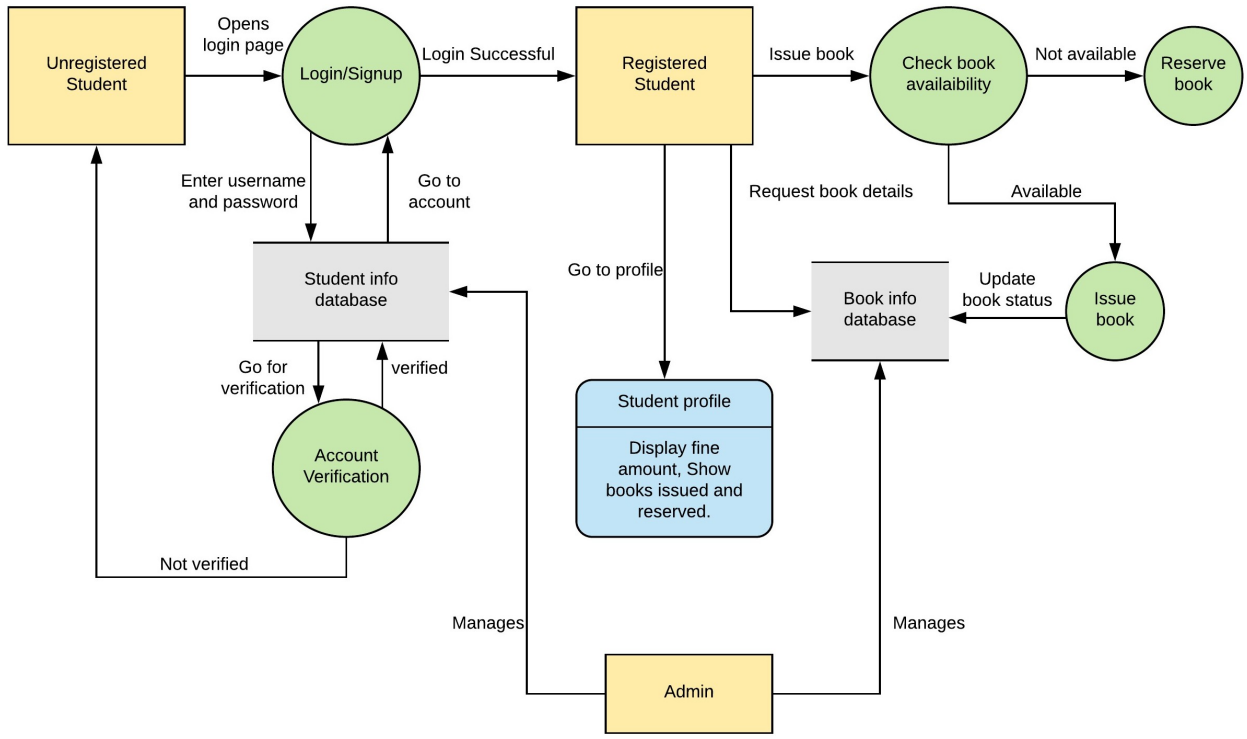
1.1 Description of the entire system

The library management app has a main entity as the library mangement system itself and two entities/actors called the database and student. The above context diagram establishes relationship between the system, the student and the database.

The student enters login details and the system searches the database for verification. Once the student details are verified the student can request the system to search for particular book and the system in turn requests the database to return the book details. Also the student upon logging in can see the current fine.
The admin who can access the system can add/delete book as well as student information to the database.
The system also has the feature to notify the student as soon as a particular book which the user has requested earlier becomes available.

2. Data Flow Diagram

2.1 Data Flow Diagram



2.2 List of Entities

An entity is a component of data. It is an object or concept about which you want to store information.

E.T.ID	Entity	Description
ET01	Unregistered Student	Goes to signup box, enters details and gets registered after verification
ET02	Registered Student	Requests book details, issues books and sees the user profile
ET03	Admin	Manages the student as well as books database

2.3 List of Data Stores

Data store are files or repositories that hold information for later use.

D.ID	Data Store Name	Description
D01	Book Database	Stores information a books like book name, author name, book id etc
D02	Student Database	Stores the information of all the registered users like name, user-id, password and also user profiles

2.4 List of Processes

A process transforms incoming data flow into outgoing data flow.

P.ID	Process Name	Description
P01	Login/signup	Login would be used by registered users whose details would be verified whereas sign up would be used by unregistered users which would result in creation of new user profile.
P02	Account Verification	Verifies the details like username, password entered by the users.
P03	Check book availability	Check whether the book requested by the user is available in the library or not.
P04	Reserve book	If book requested by the user is not currently available it bookmarks it and reserves it whenever it becomes available.
P05	Issue book	Used to request the library management to issue the book requested by the user.

2.5 List of Data Flows

Dataflows are pipelines through which packets of information flow. It is the route that data takes between the external entities, processes and data stores.

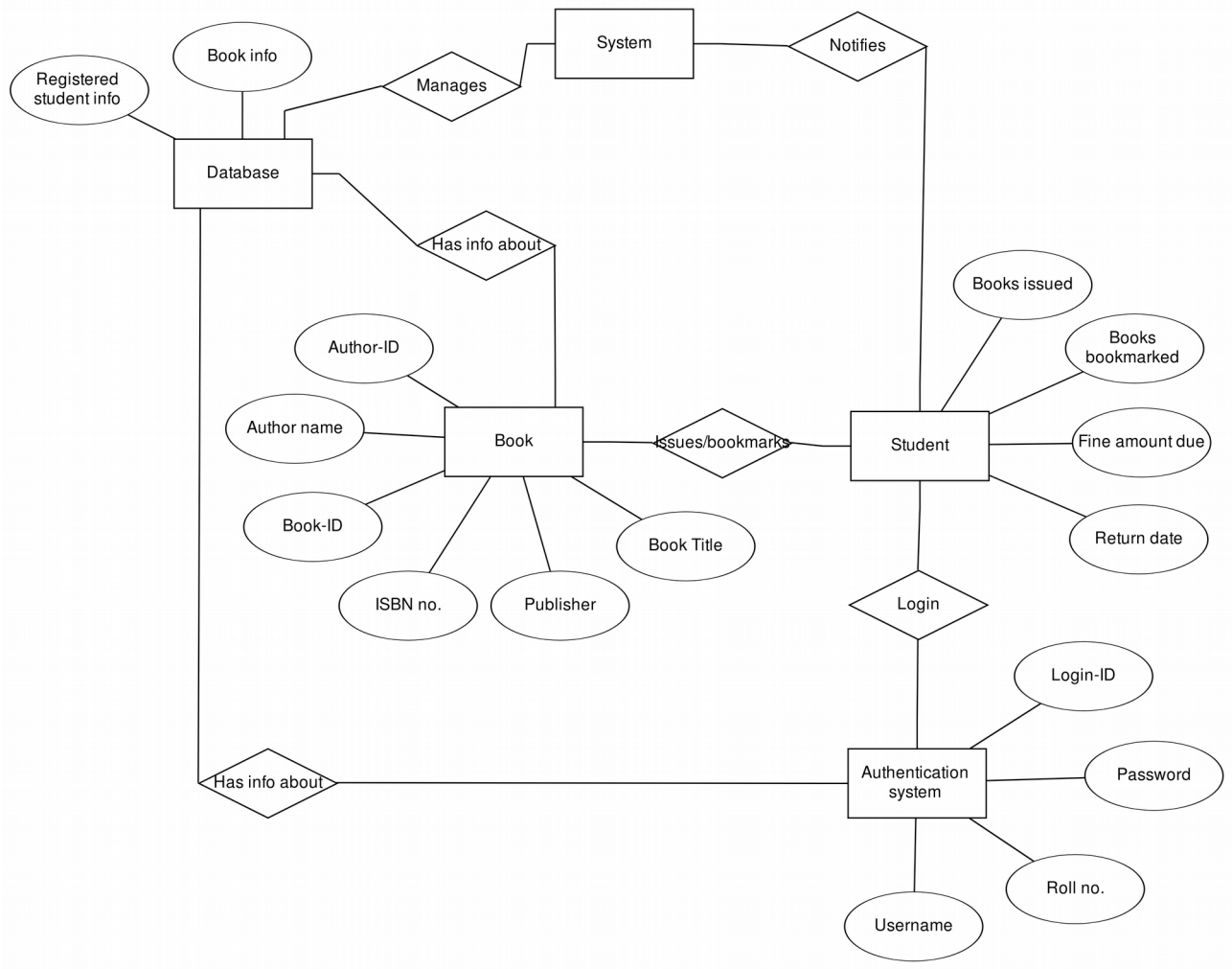
Df.ID	Data Flow	Description
DF01	Opens login page	Unregistered student opens the login page and goes to the process of login/signup.
DF02	Enter username and password	Login process sends the login details to the student database.
DF03	Go for verification	Student database sends the details to the account verification process.
DF04	Verified	If the details match the account verification process it returns back to the database.
DF05	Not verified	If in the account verification process the details don't match then it goes back to the entity unregistered user.
DF06	Go to account	After verification process the control goes to the account of the student.
DF07	Login successful	The process of login is successful and student now becomes a registered student.
DF08	Go to profile	Registered student goes to the profile where multiple processes of displaying fine,books etc are running.

DF09	Issue book	If registered student requests to issue a book the process of checking book availability.
DF10	Request book details	Registered student's requested book details are searched for in the book database.
DF11	Manages	Admin manages book database.
DF12	Manages	Admin manages student database.
DF13	Available	If book is available the process of issueing books takes place.
DF14	Not available	If book is not available the process of reserving book whenever it comes takes place.
DF15	Update book status	After the process of issueing the book the status of the book is updated in the book info database.

3. Entity Relationship Diagram

It is a graphical representation of entities and their relationships to each other, typically used in computing in regard to the organization of data within databases or information systems.

3.1 ER Diagram



3.2 List of Entities and Attributes

ET. ID	Entity	Description	List of Attributes and type
ET01	Database	Structured set of data containing infromation about the books as well as students.	1. Book Info (class book with data types string, int). 2. Registered Student Info(class student with data types string, int).

ET02	System	An entity which manages the database containing the student and the book details info and notifies the student.	(No attributes)
ET03	Book	An entity with features like title, id, publisher etc.	1. Book Title (string) 2. Book ID(string) 3. Publisher(string) 4. ISBN(int) 5. Author-ID(string) 6. Author name(string)
ET04	Student	An entity which can request for book details,issue books, bookmark books and get information about the return date.	1. Books Issued(string) 2. Books Bookmarked(string) 3. Fine amount due(float) 4. Return Date(date and time)
ET05	Authentication System	A system which authenticates the identity of the user with the help of the given attributes.	1. Login-ID(string) 2. Password(string) 3. Roll-No(string) 4. Username(string)

3.3 Relational Model

Relational Model represents how data is stored in Relational Databases. Attributes are the properties that define a relation. A relation schema represents name of the relation with its attributes.

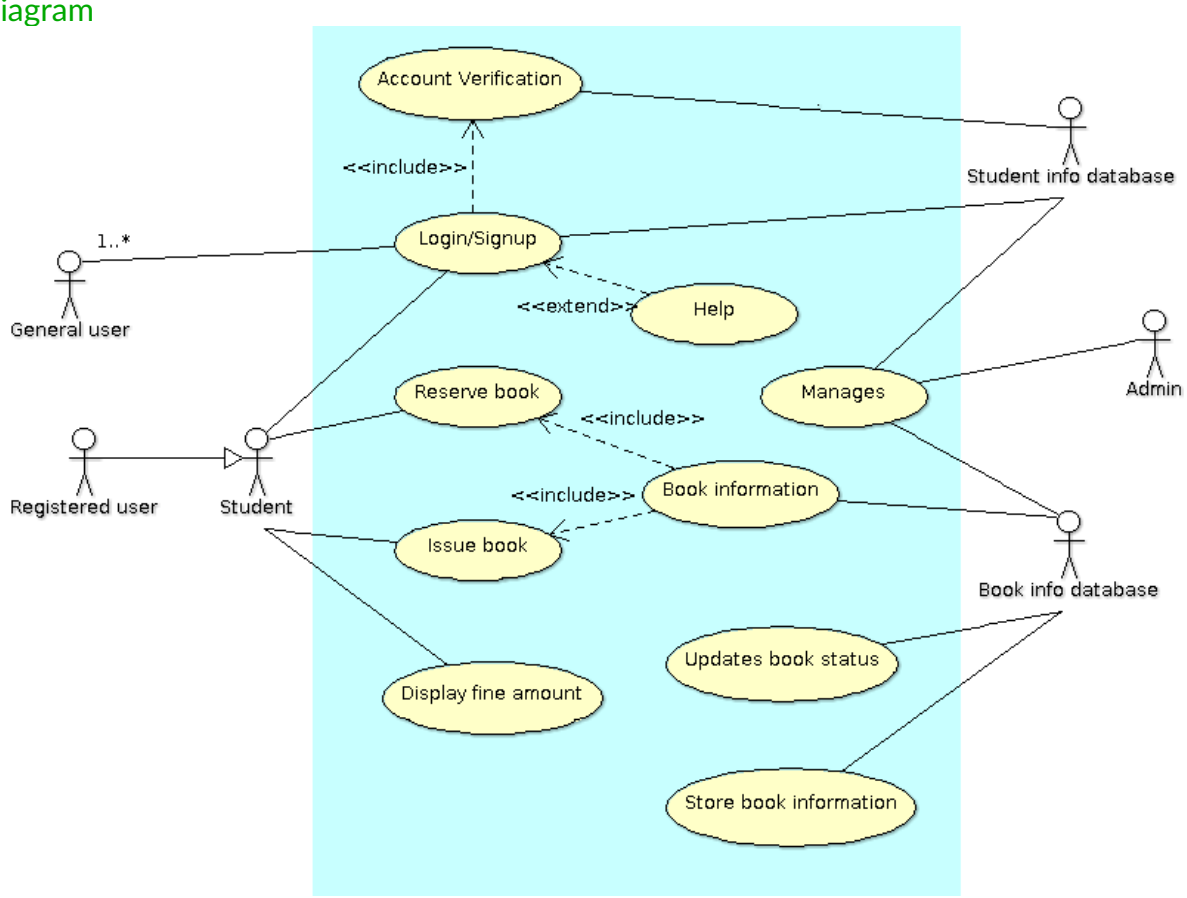
ENTITIES:	**ATTRIBUTES:**
Database	(Book Info, Registered Student Info)
Book	(Book title, Book ID, Publisher, ISBN, Author ID, Author name)
Student	(Books issued, Books bookmarked, Fine amount due, Return date)
Authentication system	(Login ID, Password, Roll No., Username)

4. Use Case Diagram

A use case diagram is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved.

4.1 UC-01: Main

Diagram



List of Use cases

A use case is a list of actions or event steps typically defining the interactions between a role and a system to achieve a goal.

S.No.	Use case name	Description	Pre-condition	Post-condition
01	Login / Signup	An unregistered user signs up and makes a new account by entering the necessary information. A registered user enters username and password to login.	User should have the Library Book Management app installed.	If the student is not a registered user and wishes to signup the details entered will get stored in a database. If the student is a registered user the details entered go to the verification use case.

02	Account Verification	Username and password information of the login procedure is verified by referring to data stored in the student info database.	Login details must be submitted.	If user is a registered user open the profile otherwise ask the user to enter the correct details and redirect back to the login/signup page.
03	Help	Provides instructions to the user on how to login or signup.	User must click the help icon and navigate to the help screen .	Display instructions as a dialog box on how to login/signup.
04	Reserve book	User can bookmark a book if it is not available in the library, but he wants to issue it when it becomes available.	Book information must be available in the database i.e. the book must exist.	Adds the book to the reserve book list so that the user can be notified when it becomes available.
05	Issue book	User can issue a book if the book database denotes it as available. User's number of library cards will decrease, and database will update status of book.	Book must be available in the library. Database should give information that the book is available.	A request to the library will be sent to reserve the book issued by the user.
06	Display fine amount	Books must be renewed every 15 days. If the user fails to do this, fine amount for each book will keep increasing every day till the book is renewed or returned.	User should be a registered user and should be logged in with the profile page open.	The fine amount is displayed on the profile page.
07	Book information	Book database provides the details about the particular book that the user requests.	Book information requested by th e user should be in the database.	The requested information should be displayed along with other details like author name etc.

08	Update book status	Whenever a book is issued or returned, the data in the database should update the availability count of that book.	The admin should be in control and the database should have enough space to add more content and the feature top successfully update the information.	Whenever the user requests for details next, the updated details should be considered.
09	Store book information	If the library buys new books or gets rid of some books, the new information must be stored in the database.	The control should be in hands of the admin and database should have enough space to add more information and the ability to update information.	Updated information should be displayed to the student on request.
10	Manage	The Admin manages the student data store and book data store	The control should be in the hands of the admin.	The control is taken from the admin and the datbase is updated.

List of Actors

An actor specifies a role played by a user or any other system that interacts with the subject. The primary actor of a use case is the stakeholder that calls on the system to deliver one of its services.

S.No.	Actor's name	Description/Actor's role
01	General user	A user who is does not have an account in the student info database.
02	Registered user	A user who has an account in the student info database, but is not logged into the account.
03	Student	A user who has an account in the student info database, and is logged into the account.
04	Student info database	A data store which contains information about all registered students' accounts i.e. their usernames and passwords.

05	Book info database	A data store which contains information about all books in the library i.e. book-id, author-id, book-title, author-name, isbn-number.
06	Admin	A user with access to modify the datastores. Admin manages the databases i.e. addition of new books, reset of system etc.

List of Associations / Generalizations / Relationships (include or exclude)

There can be 5 relationship types in a use case diagram.

- Association between actor and use case
- Generalization of an actor
- Extend between two use cases
- Include between two use cases
- Generalization of a use case

S.No.	Association	Type (Association or Generalization or include or extend)	Description
01	Actor to Actor *(Registered user to Student)*	Generalization	A registered user can inherit the properties of a student i.e. he can issue books, search books, see the fine amount etc.
02	Actor to Use case *(General user to Login / Signup)*	Association	A general (unregistered) user has to sign up to make an account to access the features of the app.
03	Actor to Use case *(Student to Login / Signup)*	Association	A Student has to Login to access the features of the app.
04	Actor to Use case *(Student to Issue book)*	Association	A Student can issue a book if the book is available.
05	Actor to Use case *(Student to Reserve book)*	Association	A student can bookmark a book if he wishes to issue it but it is not available.

06	Actor to Use case *(Student to Display fine amount)*	Association	Fine amount is calculated every day. Student can see the fine amount due.
07	Actor to Use case *(Student info database to Account Verification)*	Association	Account verification procedure requires information from the student info database, such as username and password to check whether it is matching or not.
08	Actor to Use case *(Student info database to Login / Signup)*	Association	When a new user enters his details, the details should get stored in the student info database.
09	Actor to Use case *(Admin to Manage)*	Association	Admin has the authority to manage the system.
10	Actor to Use case *(Student info database to Manage)*	Association	Student info database needs to be managed by the admin in case of any bug or discrepancy.
11	Actor to Use case *(Book info database to Manage)*	Association	Book info database needs to be managed by the admin in case of arrival of new books into the library, or riddance of old books from the library.
12	Actor to Use case *(Book info database to Update book info)*	Association	The book info database need to update within itself the availability count of the book in case of issue or return.
13	Actor to Use case *(Book info database to Store book info)*	Association	The book info database needs to store the information of new book arriving in the library, or old books removed from the library.
14	Actor to Use case *(Book info database to book info)*	Association	Book info database has to provides book information to the user when the user searches for the book.

15	Use case to Use case *(Login/Signup to Account Verification)*	include	When a user tries to log in by entering username and password, Account verification process checks whether the username and password match or not.
16	Use case to Use case *(Help to Login / Signup)*	extend	Help is not required for Login / Signup to function. It is for the convenience of the user if he needs instructions on how to login / signup.
17	Use case to Use case *(Book info to Issue book)*	include	When user tries to issue a book, book information of the book is displayed to the user.
18	Use case to Use case *(Book info to Reserve book)*	include	When user tries to bookmark a book, book information of the book is displayed to the user.

5. Summary

The above report is for the software engineering project “LIBRARY BOOK MANAGEMENT APP”.
It consists of a context diagram which shows the relationship between the library management system, student and database. The report explains all the relationships by giving a brief description.

A dataflow diagram is used to show properly the dataflow between the entities and the processes. All the entities, databases and processes are enlisted along with a brief description exlaining their working.

An entity relationship diagram is also added in the report along with a list of entities and the attributes each entity has. The entities are described briefly and the data type for each attribute is also listed. A relationship model is also built for the same.

A use case diagram to show the interaction of the user with the system is also imported in the report. All the use cases are enumerated with a proper description of the use case along with the pre and post conditions for each use case. All the actors and their roles are highlighted. The report also states all the associations existing in the use case diagram between actors, actor and use case and use cases.

Overall this report helps in identification of the detailed features of the system like the roles of all the entities, the relationships between entities, conditions to be evaluated to make a particular feature work and the output to be displayed etc. It gave a detailed insight into the project and helped in understanding the project better.