

Library Management System

Name: Arjun Bista

Student Id: 918462199

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Professor: Jose Ortiz Costa

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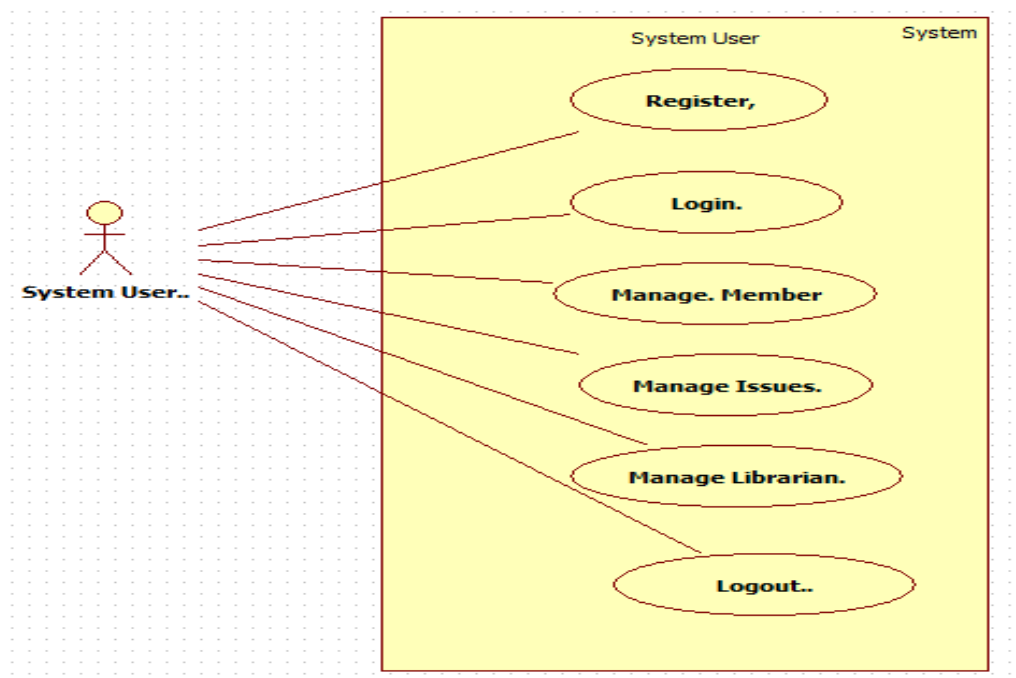
Library Management System

Section I: Project Description

Library management system is meant to keep track of the books catalog. It also provides a platform for the students to access library services such as borrowing books using this system. With this system, the librarian issues the books to the students and input all the necessary details about the student. Similarly, this system allows additional of the new books to the catalogue and viewing of various reports relating to the books in the database, borrowing history of the students, systems users among others. Implementation of this database system involves various main entities that include Student, Book, Library, User as well as Catalog.

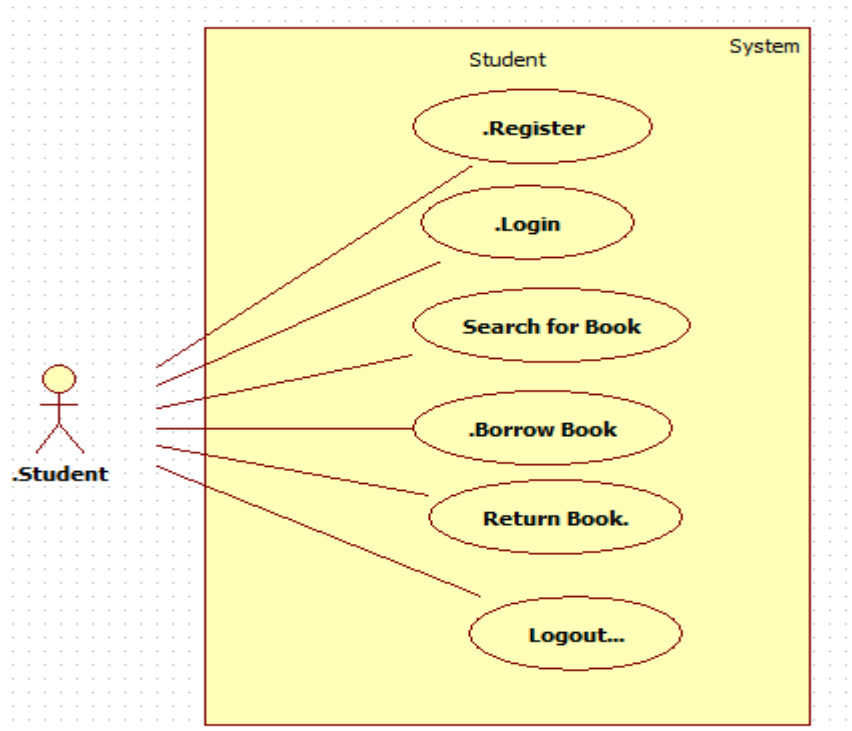
Section II: Use Cases

Use Case Diagram 1

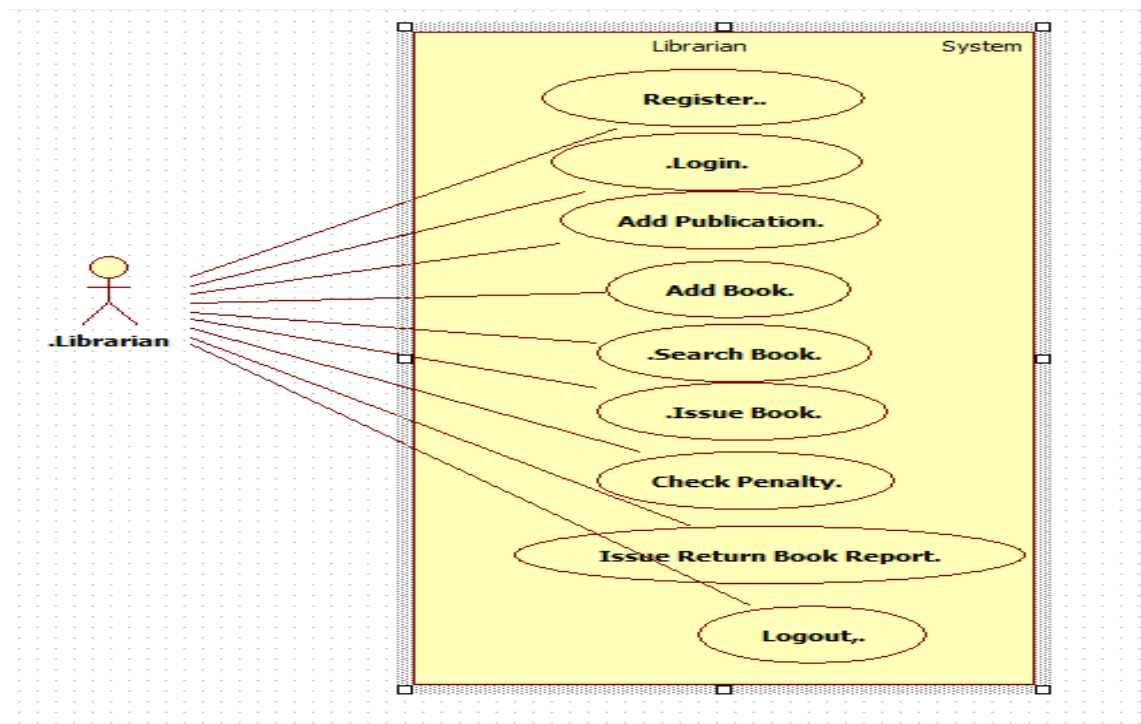


The use case diagram above captures use cases for system users, which include register, login, manage member, manage issues, manage librarian and logout. This use case diagram has one actor, which is system user.

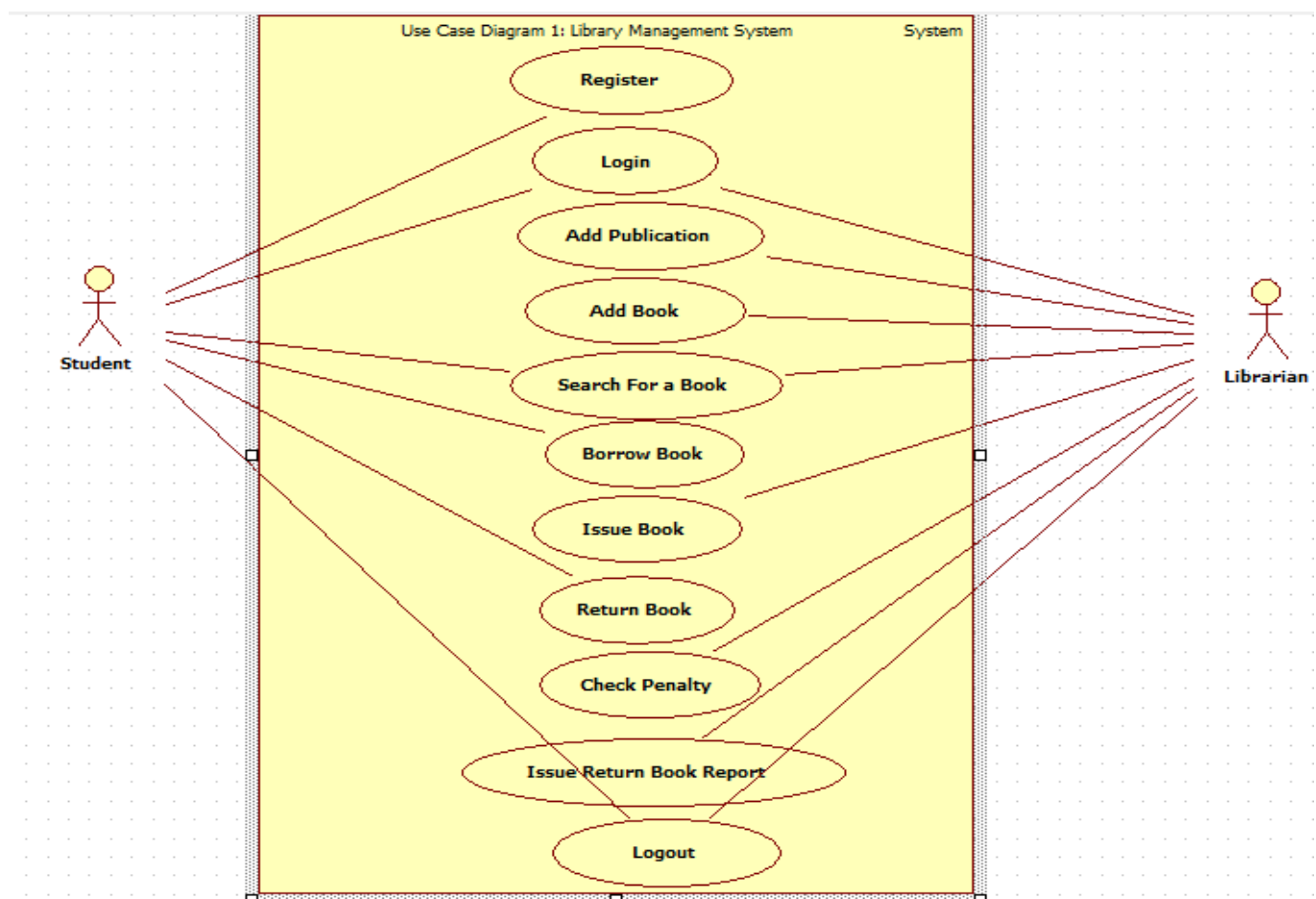
Use Case Diagram 2



This use case diagram belongs to the student and provide the functionalities within the student module, which include register, login, search for a book, borrow a book, return a book and logout from the system.

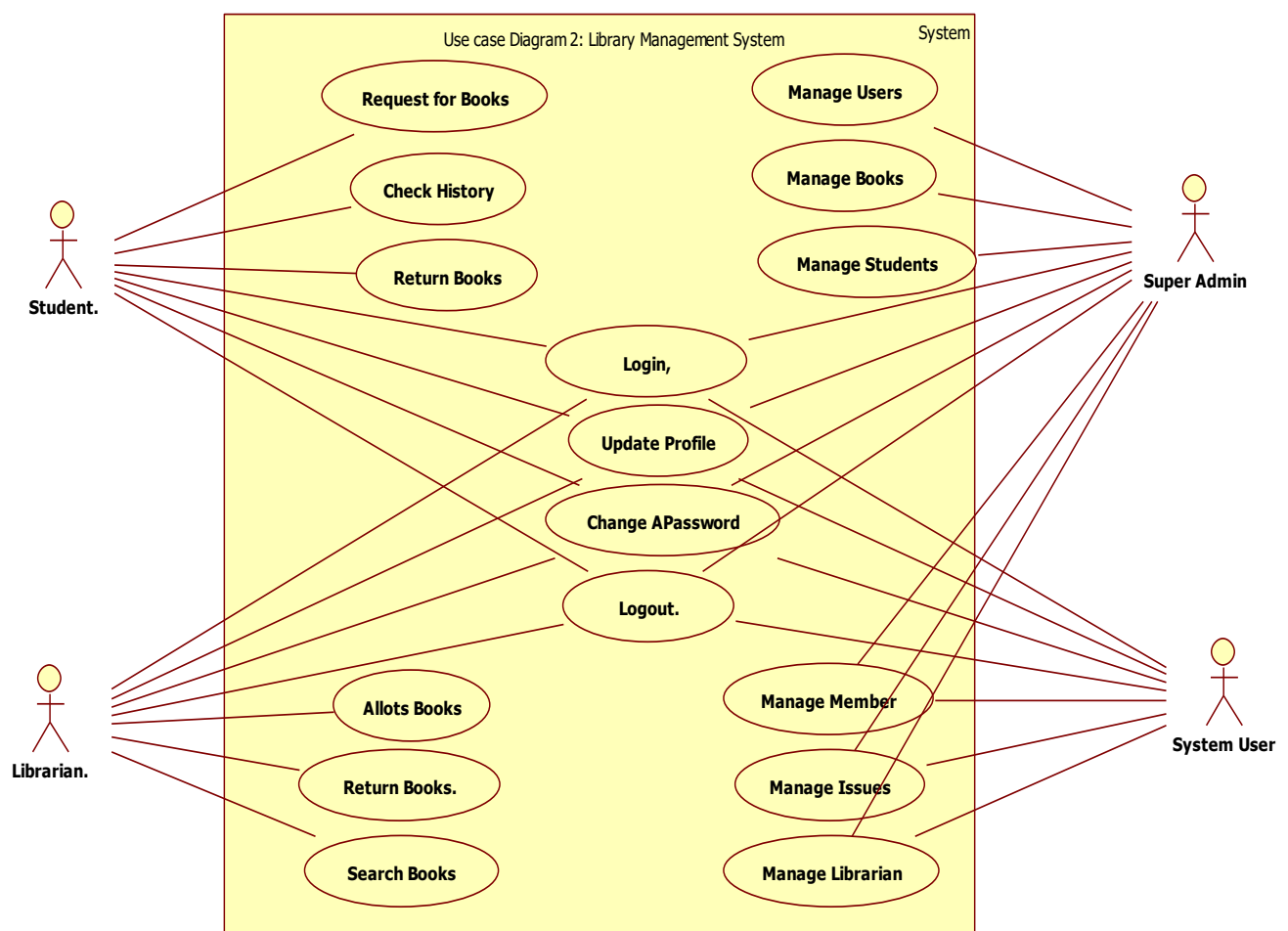
Use Case Diagram 3

The above use case diagram describes librarian as an actor and has several use cases, which include register, login, add publication, add book, search for book, issue book, check penalty, issue return book report and logout as shown in the above diagram.

Use Case Diagram 4

The above-mentioned use case diagrams depict the functionalities of the library management system, specifically capturing two main actors who are the student and librarian. In this diagram, the student must register first with the system and then login to access the services offered by the system. After being authenticated, the student can use the system with ease and security. The student can search for the book that he/ she wants using the book code or name and then after finding it, will be given an option to borrow the book. Once the become is found from the system, the use can get issued with the book using the unique school id. Once the book has been issued, it should be return by the due date. At regular intervals, the user may check from the system if there is any fine imposed. The system allows administrator to monitor this process and all the activities at their end. Other tasks that librarian should do is to record the new books to the system

Use Case Diagram 5



In the above second diagram, the relationships between the actors and the use cases of the system can be summarized as follows.

Student: The main use cases for the students include request for the books, return books and check history.

Librarian: The librarian entity has the following main use cases: search books, allot books, return books as well as manage students.

Super Admin: The super admin entity has the following primary use cases: manage issues, manage students, manage books, manage member, manage librarian manage users and applications, manage address, among others.

System User: The fundamental use cases for system user entity include manage issues, manage books, manage students, manage member, manage librarian, manage address, etc.

Section III: Business Rules

Business rules for the library management system are the database requirements extracted from use cases. Such rules also define the functionalities provided by the system. For the case of the library management system, the rules below shall apply.

1. A user can create only one account
2. Users should be able to rent not more than 3 books at the same time.
3. Books borrowed must be recorded in the catalog
4. Librarian must be registered as a system user
5. Accounts should be linked to the library

6. Student who have not returned books are invoiced for that.
7. A book must be borrowed via the account
8. Librarian should be able to search for the existence a book in the library
9. Librarian should be able to search for a book from the catalog
10. Librarian should be able to manage the data

Section IV: Detailed List of Main Entities, Attributes and Keys

The primary goal of this section is to provide detailed information of the main entities, attributes as well as the keys in the library system as illustrated below.

1. System User.

- userId key
- firstname: composite
- lastname: composite
- username: composite
- email: composite
- dob: multivalue
- phone number:

2. Student

- studentId: key
- firstname: composite
- lastname: composite
- username: composite
- email: composite
- dob: multivalue
- phoneNumber

3. Book

- ISBM: key

- name: composite
- subject: composite
- overview: composite
- publisher: composite
- publicationDate: multivalue
- language

4. Library

- id: key
- name: composite
- address: multivalue

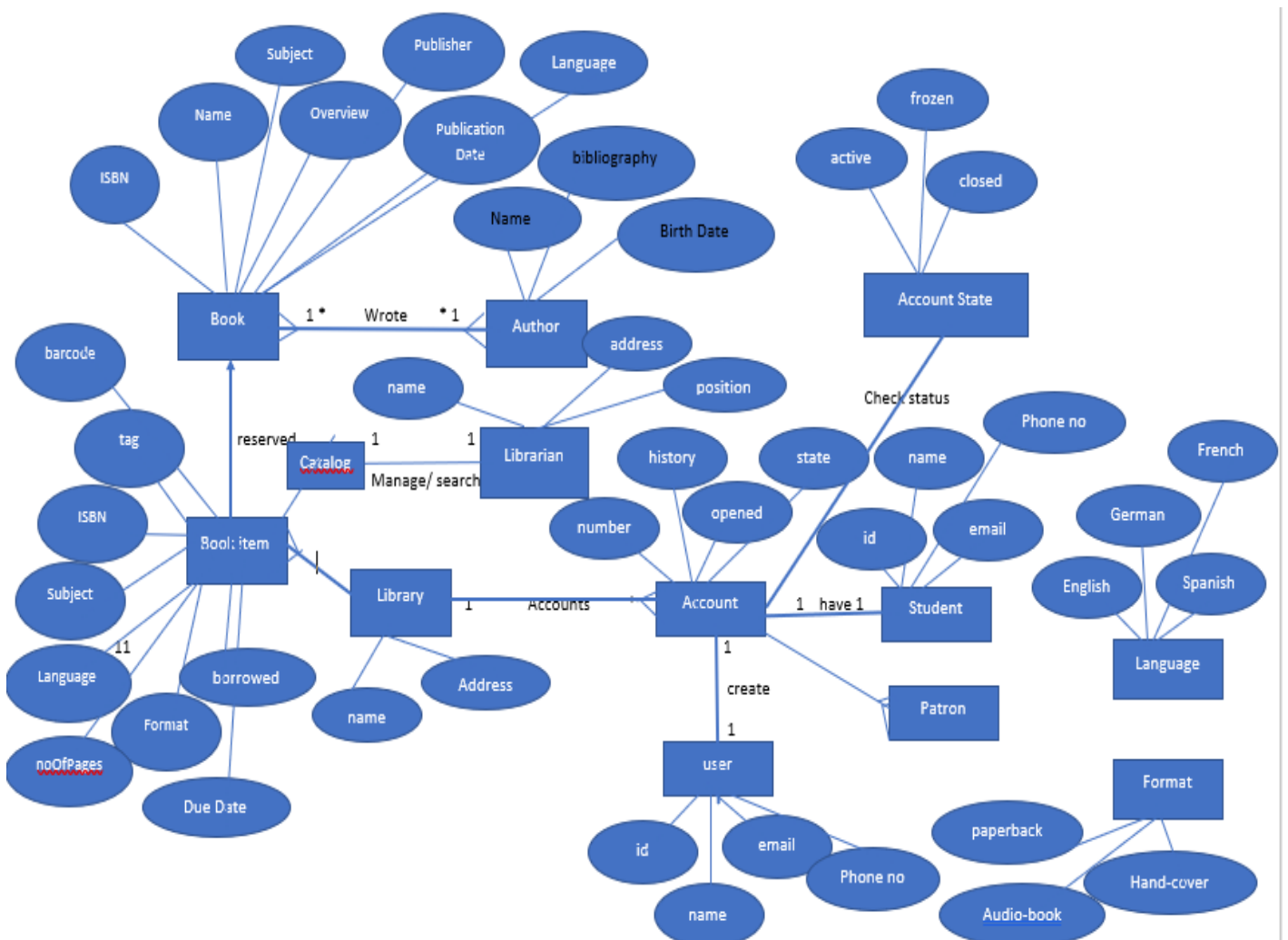
5. Account

- number: key
- history: composite
- opened: multivalue
- state: composite

6. Catalog

- creationDate: multivalue
- totalBooks
- bookTitles: composite
- bookAuthors
- bookSubject: composite
- bookPublicationDates: multivalue

Section V: Entity Relationship Diagram (ERD)



The above Entity Relationship Diagram comprises an in-depth information about all the possible entities for the Library Management System together with their attributes and the relationships among those entities. As captured in the diagram, the possible types of

relationships between the entities have also been captured in this paper. It is worth to note that in ERD the relationships can be one -to many, one to one and many to many relationship. Some of the entities captured in this diagram include Book, Author, Account, Library, Librarian, Catalog, Book Item, among others as indicated in the above table. The diagram is self-explanatory, and the reader can easily understand the relationships between the entities.

Section VI: Testing Table

The table below tests the relationships available in the ERD

Rule	Entity A	Relation	Entity B	Cardinality	Pass/Fail	Error Description	
-----	-----	-----	-----	-----	-----	-----	
1	Student	Search	Book	M-to- M	Pass	None	
2	Student	borrows	Book	M-to-M	Pass	None	
3	Student	Returns	Book	1-to- M	Pass	None	
4	Librarian	add	Book	1-to- M	Pass	None	
5	Librarian	Search	Book	1-to- M	Pass	None	
6	Librarian	Issue	Book	1-to- M	Pass	None	
7	Super Admin	manage	Users	1-to- M	Pass	None	
8	Book Item	recorded	Catalog	1-to- 1	Pass	None	
9	Librarian	manage/ search	Catalog	1-to- 1	Pass	None	
10	Book	written	Author	M-to- M	Pass	None	