9/27/2023

Lab Session – 7
Domain Analysis Modeling & Sequence Diagram.
IT313: Software Engineering

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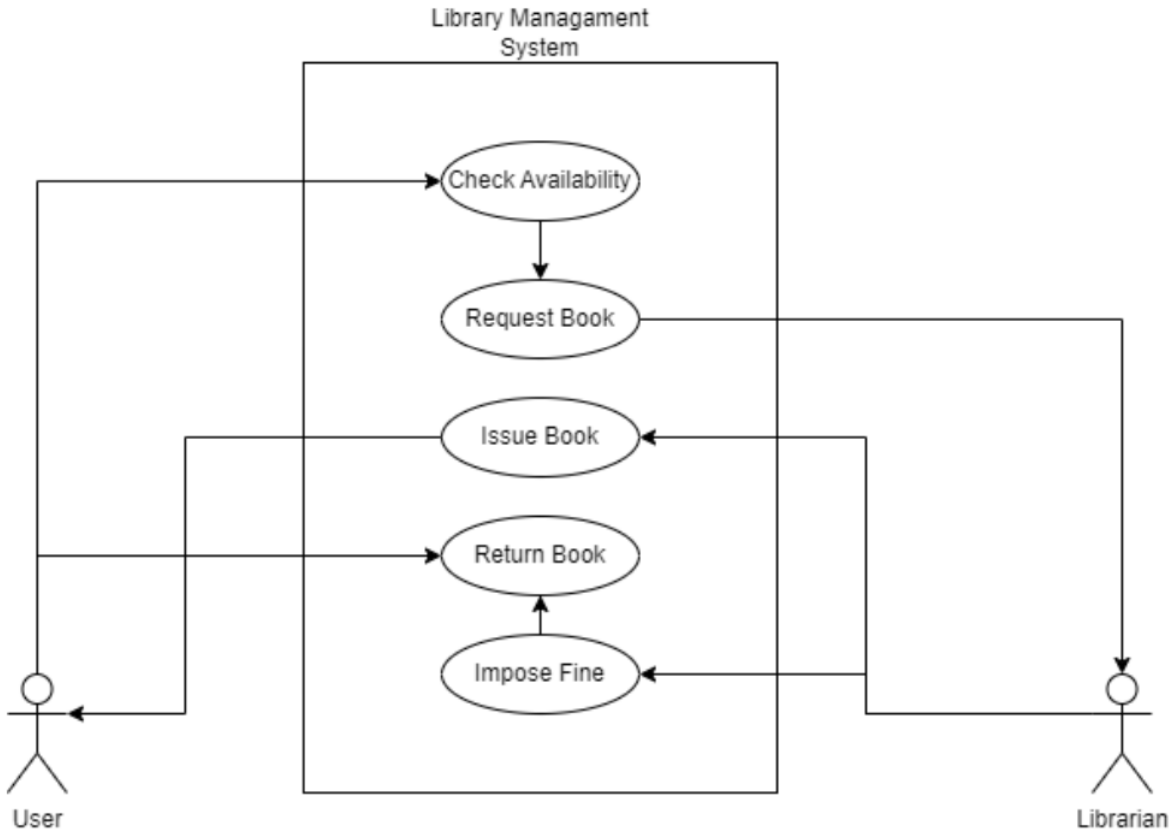
Q.1. Consider the following piece of text

“A library maintains multiple reading materials which include books, journals, and magazines. The books are
issued to the registered students of the institute, for a specified period of time. The issued books are to be returned back to the library. Delayed returns are subjected to stipulated fines. The issue-return process is administered by one of the librarians through an authenticated Library Management System.”

An incomplete use case diagram for the system is given above. Develop the following documents :

1. **Complete the use case diagram for the above problem text along with use case documentation for “issueBook” use case.**

Solution:



2. The sequence diagram for the “issueBook” use case.
(Hint: Here you need to identify various analysis objects (corresponding to entity, boundary, and control classes), and show their interaction to realize the “issueBook” use case.)

Solution:

Use Case Documentation

Name: Issue book from the library

Primary Actor: Librarian

Other Actors: Students, faculty, database (consisting of a catalog of books and personal information of users)

Stakeholders and Interests:

i) *Librarian:*
The librarian wants to determine whether the user who requested to borrow a book is a registered user or not, lend the requested book to a registered user, and apply any appropriate late fees.

ii) *Student/faculty:*
Wants to determine whether any book in the library is available and asks to be issued a copy of one that is.

Preconditions:
There should be an administrator who has access to the database and can Success Guarantee / Goals: A book's status in the catalogue is modified to "issued."

The student's profile is updated and contains data on the book issue. Student goes to the librarian with a book to be issued.
Main Scenario:
1. The student comes to the librarian with the book to be issued.
2. The librarian confirms the student to determine whether or not he is a library member.
3. The librarian changes the book's status from available to issued.
4. The librarian updates the student's profile with the provided books.
5. The book is given to the student.
3. Draw the analysis object diagram for the “issueBook” use case analysis.

Extensions (Alternative Flow):

At any time, if the system fails:

1. The system can recover the prior state.

2. If prior state has anomalies,
   a. the process is cancelled and started again
   b. librarian can manually update the issue process

At any time, student asks to not issue book

1. The issue transaction is cancelled and the book is returned to the librarian.

2.a If the user is invalid, the issue transaction is cancelled and the book is returned to the librarian.

3.a If the book is held by someone, the issue transaction is cancelled and the book is returned to the librarian.

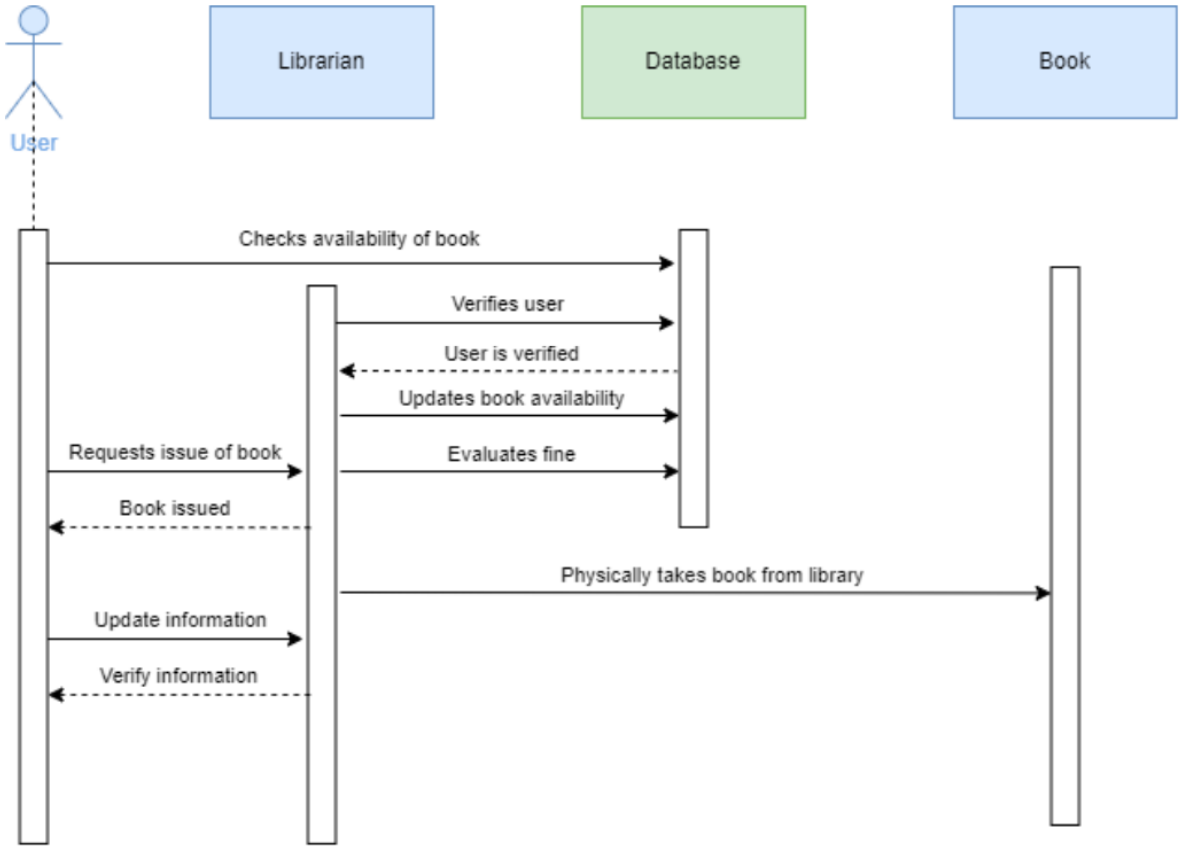
Special Requirements:

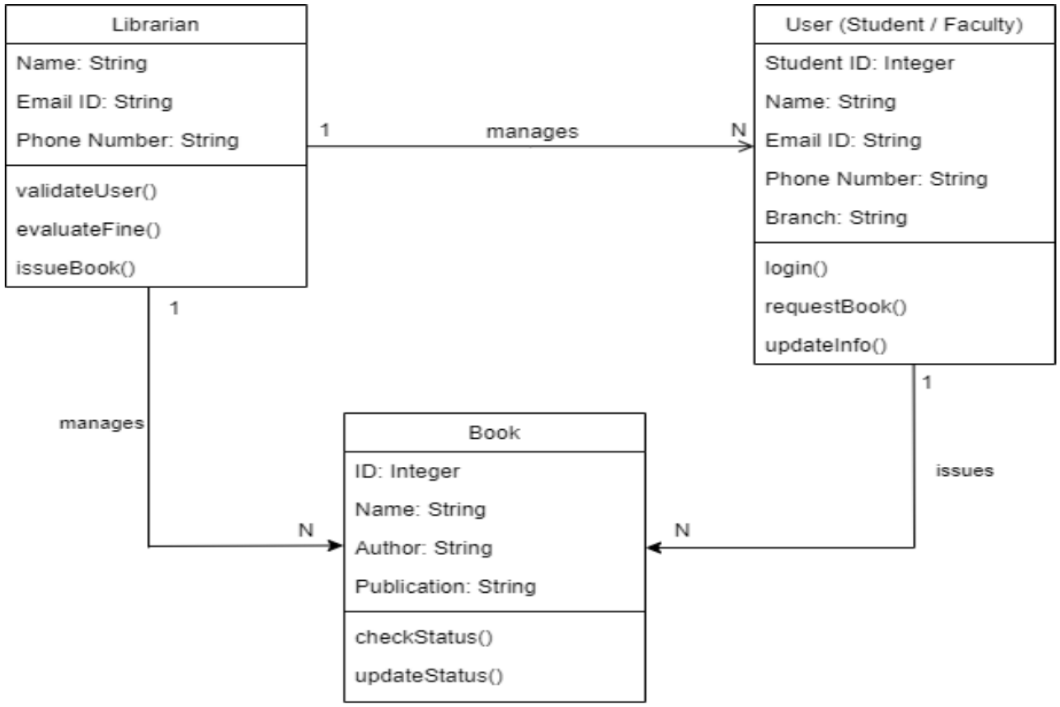
- Robust recovery
- Quick authorization response
- Timely updates on the system

Postconditions:
The system returns to dashboard, ready for another issue or return transaction

3. Draw the analysis object diagram for the “issueBook” use case analysis.

Solution. :





Q.2. To give an exam, an instructor first notifies the students of the exam date and the material to be covered. She then prepares the exam paper (with sample solutions), gets it copied to produce enough copies for the class, and hands it out to students on the designated time and location. The students write their answers to exam questions and hand in their papers to the instructor. The instructor then gives the exam papers to the TAs, along with sample solutions to each question, and gets them to mark it. She then records all marks and returns the papers to the students. Draw a sequence diagram that represents this process. Make sure to show when is each actor participating in the process. Also, show the operation that is carried out during each interaction, and what its arguments are.

Solution. :