Use Case Diagram for the Library Management System

Learn how to define use cases and create the corresponding use case diagram for the library management system.

Let's build the use case diagram for the library management system and understand the relationship between its different components.

First, we will define the different elements of our library, followed by the complete use case diagram of the system.

System

Our system is a "library."

Actors

Next, we will define the main actors of our library management system.

Primary actors

- **Member:** This actor is the client of the library. It can search, reserve, renew, or return a book and modify its library membership.
- **Librarian:** It acts as an admin in a library management system. It can add or remove a book as well as modify the status of members or books. It can also issue and return books.

Secondary actors

- **System:** It can send alerts related to reservations and late returns of books.

Use cases

In this section, we will define the use cases for the library. We have listed the use cases according to their respective interactions with a particular actor.

> **Note:** You will see some use cases occurring multiple times because they are shared among different actors in the system.

Librarian

- **Add book:** To add a new book to the library
- **Remove book:** To remove an existing book from the library
- **Edit book:** To modify a book
- **Register new account:** To register a new library member
- **Cancel membership:** To cancel the library membership of a member
- **Register/Update account:** To create or update an account
- **Login/Logout:** To log in or log out account
- **Issue book:** To issue a book to a member

- **Remove reservation:** To remove reservation of books

- **Renew book:** To renew the issuance of the book

- **Reserve book:** To reserve a book that is currently not available

- **View account:** To view the account and access all account details

Member

- **Search catalog:** To search for a book in the library

- **Cancel membership:** To cancel the library membership of a member

- **Register/Update account:** To create or update an account

- **Login/Logout:** To log in or log out of the account

- **Checkout book:** To complete the issue book process

- **Remove reservation:** To remove the reservation of books

- **Renew book:** To renew the issuance of the book

- **Reserve book:** To reserve a book that is currently not available

- **View account:** To view the account and access all account details

- **Return book:** To return a book to the library

System

- **Overdue notification:** To send an alert if the book is not returned on time

- **Reservation available notification:** To send an alert when the book is available for reservation

- **Reservation canceled notification:** To send an alert when a book reservation is canceled

There are some use cases that are not directly related to any actor. They are elaborated below.

- **Add book item:** To add an item of a book in the catalog

- **Edit book item:** To edit the details of a book item in a catalog

- **Remove book item:** To remove a book item from the catalog

- **Update catalog:** To update (add, edit, or remove) a book item or book from the catalog
- **Issue library card:** To issue a library card to new members that will be for identification.
- **By subject name:** To search for a book in the catalog by its subject name
- **By book title:** To search for a book in the catalog by its title
- **By author name:** To search for a book in the catalog by its author name
- **By publication date:** To search for a book in the catalog by its publication date
- **Pay fine:** To pay a fine if the book is returned after the due date

Relationships

This section describes the relationships between and among actors and their use cases.

Generalization

We can search for a book with the title, subject name, author name, or publication date. This shows that the "Search catalog" use case has a generalization relationship with "By subject name," "By book title," "By author name," and "By publication date" use cases.

Associations

The table below shows the association relationship between actors and their use cases.

Librarian	Member	System
Add book	Search catalog	Overdue notification
Remove book	Cancel membership	Reservation available notification

Edit book	Register/Update account	Reservation canceled notification
Register new account	Login/Logout	
Cancel membership	Checkout book	
Register/Update account	Remove reservation	
Login/Logout	Renew book	
Issue book	Reserve book	
Remove reservation	View account	
Renew book	Return book	
Reserve book		
View account		

Include

- To add a new book, we add its copies (book items), so the "Add Book" use case has an include relationship with the "Add book item" use case.
- To edit a book, we need to edit its items, so the "Edit Book" use case has an include relationship with the "Edit book item" use case.
- To remove a book from the library, we need to remove its items, so the "Remove Book" use case has an include relationship with the "Remove book item" use case.
- To update a catalog, we need to update all the book items. This will include adding, editing, or removing a book item since "Edit book item," "Add book item," and "Remove book item" have an include relationship with the "Update catalog" use case.
- To issue a book, we need to go through a checkout process, so the "issue book" use case has an include relationship with the "Checkout book" use case.
- Whenever we go through the checkout process, our book reservation will be removed as it had been issued. So the "Checkout book" use case has an include
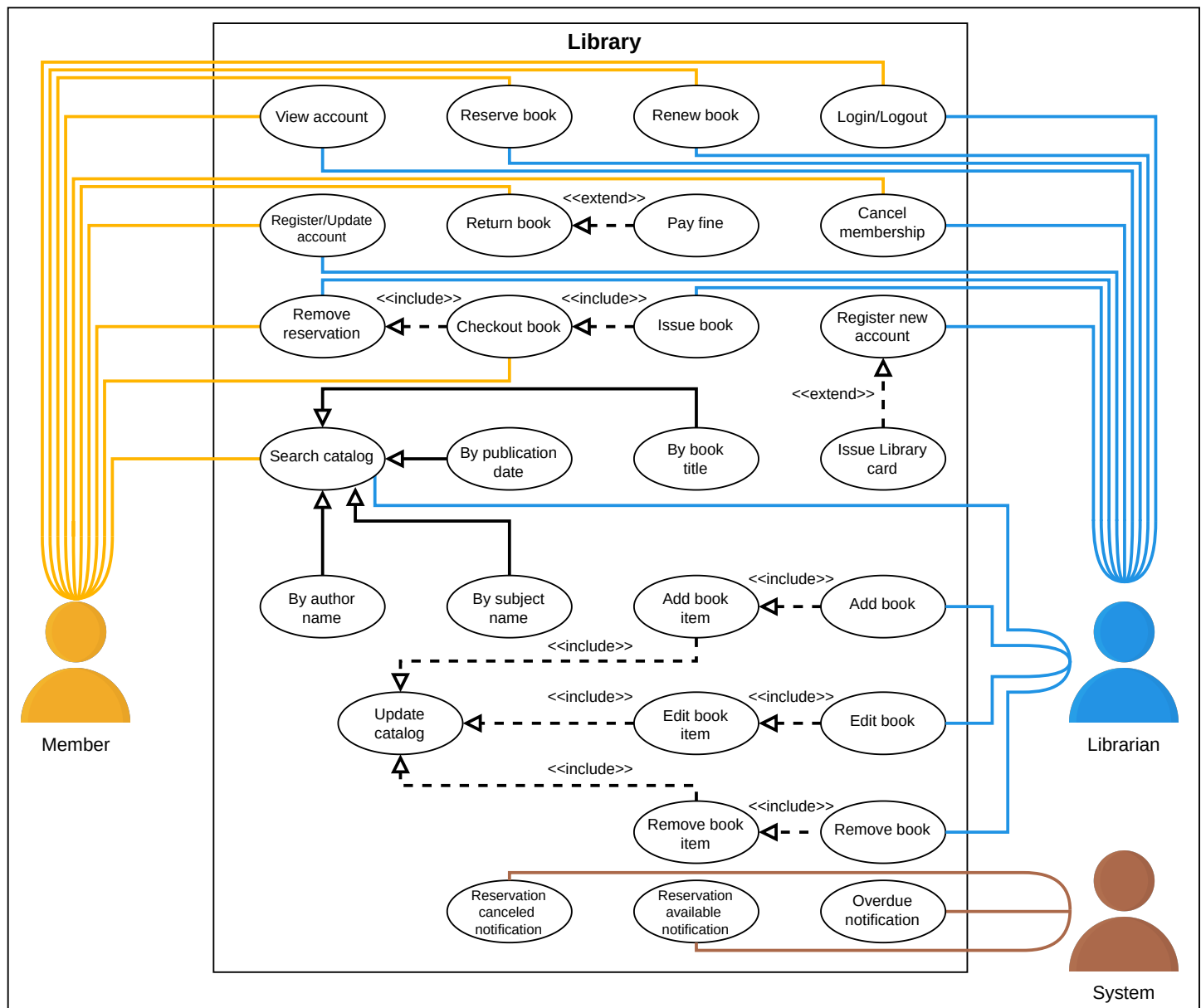
relationship with the "Remove reservation" use case.

Extend

- When a new member is registered, a library card is issued. So the "Register new member" use case has an extend relationship with the "Issue library card" use case.

- Whenever a member returns a book, the librarian will check if the submission is late or not and will ask the member to pay for a fine if it exists, so the "Return book" use case has an extend relationship with "Pay fine" use case.

Use case diagram

Here is the use case diagram of the library management system:

In the next lesson, we will discuss the class diagram with a detailed explanation of all classes and their relationship with each other.

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