Library Management System Documentation

Overview

The Library Management System is a software application that helps in managing a library's resources including books, authors, and patrons. It allows users to search for books by various criteria, borrow and return books, and manage information related to authors and patrons.

Classes

1. Library

The Library class is the central component that manages books, authors, and patrons. It provides methods to search for books, borrow and return them.

2. Book

The Book class represents a book in the library. It contains information such as the title, author, ISBN, publisher, and the number of available copies. It implements the Borrowable interface for borrowing and returning functionality.

3. Author

The Author class represents the authors of the books. It contains information about the authors and the list of books they have written.

4. Patron

The Patron class represents the patrons of the library. It contains information about the patrons and the list of books they have borrowed.

5. Borrowable

The Borrowable interface defines the methods for borrowing and returning books.

6. Status

The Status enum defines the various states that a book can have in the library, including AVAILABLE, CHECKED_OUT, and OVERDUE.

How to Start/Access the Application:

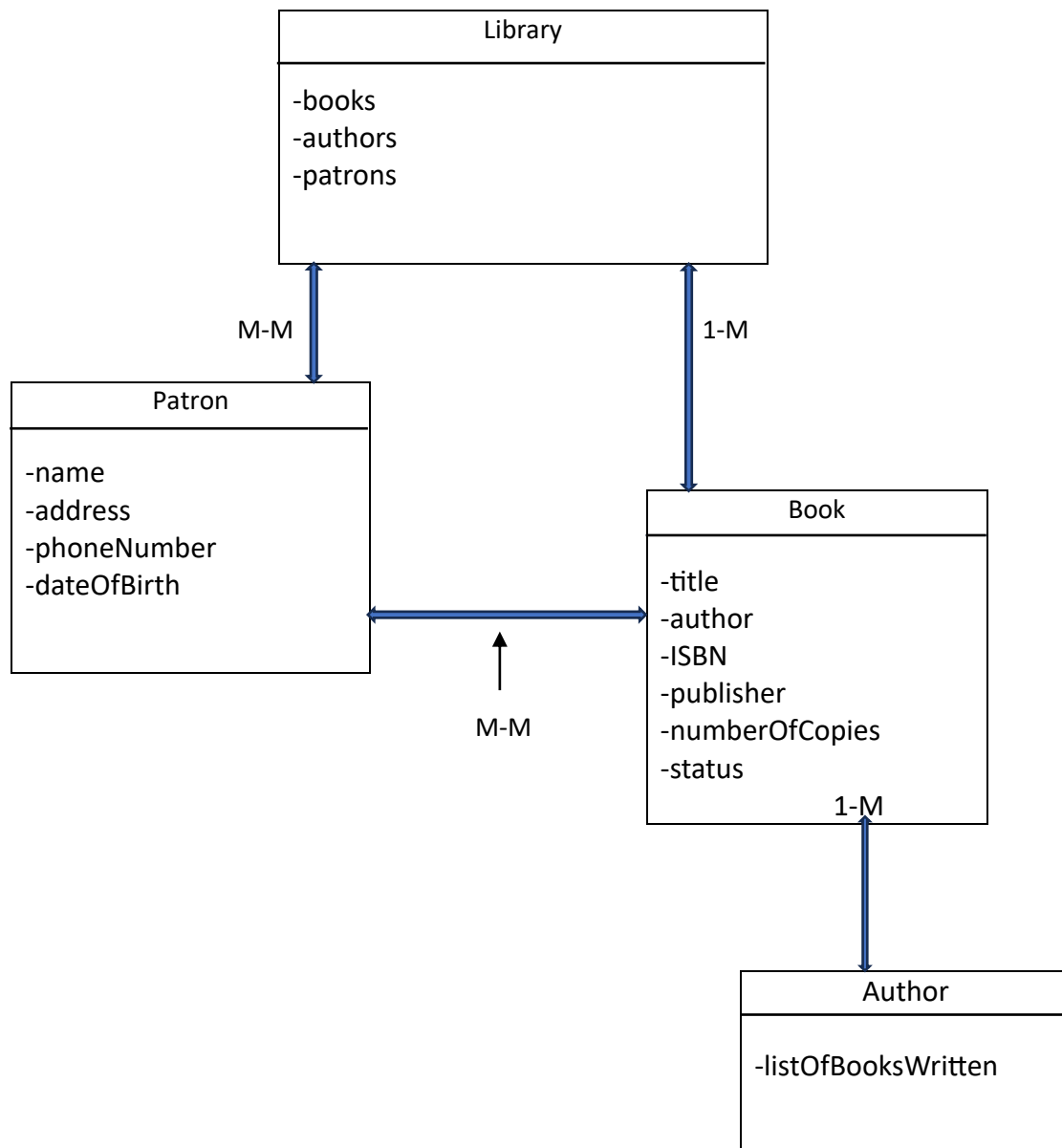To access the Library Management System, follow these steps:

Open the application.
Once the application is launched, make your way to the Main file.

Users can perform various actions such as searching for books, borrowing, and returning books using the provided interface.

Class Diagram

Below is the class diagram illustrating the relationships between the different classes in the Library Management System:

```
                         Library
          ┌──────────────────────────────────┐
          │  -books                          │
          │  -authors                        │
          │  -patrons                        │
          └──────────────────────────────────┘
```

M-M   1-M

```
      Patron                              Book
┌────────────────────┐          ┌────────────────────────┐
│  -name             │          │  -title                │
│  -address          │◄────────►│  -author               │
│  -phoneNumber      │          │  -ISBN                 │
│  -dateOfBirth      │          │  -publisher            │
└────────────────────┘          │  -numberOfCopies       │
                    M-M          │  -status               │
                                 └────────────────────────┘
                                                    1-M
```

```
                    Author
          ┌────────────────────────┐
          │  -listOfBooksWritten   │
          └────────────────────────┘
```

Explanation of Relationships:

1. One-to-Many (Library to Book):
   - Each Library can have multiple Books, but each Book belongs to only one Library. This is represented by the association between Library and Book, where Library contains a list of Books.

2. One-to-Many (Author to Book):
   - Each Author can have multiple Books, but each Book has only one Author. This is represented by the association between Author and Book, where Author contains a list of writtenBooks.

3. Many-to-Many (Library to Patron):
   - Each Library can have multiple Patrons, and each Patron can belong to multiple Libraries. This is represented by the association between Library and Patron, where Library contains a list of Patrons, and Patron contains a list of Libraries.

4. Many-to-Many (Book to Patron):
   - Each Book can be borrowed by multiple Patrons, and each Patron can borrow multiple Books. This is represented by the association between Book and Patron, where Book contains a list of borrowedBooks, and Patron contains a list of borrowed Books.

These relationships capture the interactions and dependencies between the classes in the Library Management System, allowing for efficient management of library resources and patron activities.