**Library Management System Documentation**

**1. Introduction**

The Library Management System is a Java-based application designed to manage library items, authors, and patrons efficiently. The system allows librarians to add, edit, and delete books and periodicals, manage author information, and handle patron details. Additionally, it provides functionalities for borrowing and returning library items.

**2. Class Descriptions**

**2.1 LibraryManagementSystem**

* **Description**: Manages the overall library system including items, authors, and patrons.
* **Attributes**:
  + items: A list of library items.
  + authors: A list of authors.
  + patrons: A list of patrons.
* **Methods**:
  + getItems(): Returns the list of library items.
  + getAuthors(): Returns the list of authors.
  + getPatrons(): Returns the list of patrons.
  + addItem(LibraryItem item): Adds a new library item.
  + editItem(String id, String title, Author author, String ISBN, String publisher, int numberOfCopies): Edits an existing library item.
  + deleteItem(String id): Deletes a library item.
  + addAuthor(Author author): Adds a new author.
  + editAuthor(String name, Date dateOfBirth): Edits an existing author.
  + deleteAuthor(String name): Deletes an author.
  + addPatron(Patron patron): Adds a new patron.
  + editPatron(String name, String address, String phoneNumber): Edits an existing patron.
  + deletePatron(String name): Deletes a patron.
  + borrowItem(Patron patron, LibraryItem item): Borrows a library item.
  + returnItem(Patron patron, LibraryItem item): Returns a library item.
  + searchItem(String keyword): Searches for a library item.

**2.2 LibraryItem (Abstract Class)**

* **Description**: Represents a library item.
* **Attributes**:
  + id: The unique identifier of the item.
  + title: The title of the item.
  + author: The author of the item.
  + ISBN: The ISBN number of the item.
  + publisher: The publisher of the item.
  + numberOfCopies: The number of copies available.
* **Methods**:
  + getId(): Returns the item ID.
  + getTitle(): Returns the item title.
  + getAuthor(): Returns the item author.
  + getISBN(): Returns the item ISBN.
  + getPublisher(): Returns the item publisher.
  + getNumberOfCopies(): Returns the number of copies available.
  + setTitle(String title): Sets the item title.
  + setAuthor(Author author): Sets the item author.
  + setISBN(String ISBN): Sets the item ISBN.
  + setPublisher(String publisher): Sets the item publisher.
  + setNumberOfCopies(int numberOfCopies): Sets the number of copies available.

**2.3 Book (Extends LibraryItem)**

* **Description**: Represents a book in the library.
* **Attributes**:
  + format: The format of the book (Printed, Electronic, Audio).
* **Methods**:
  + getFormat(): Returns the book format.
  + setFormat(String format): Sets the book format.

**2.4 Periodical (Extends LibraryItem)**

* **Description**: Represents a periodical in the library.
* **Attributes**:
  + type: The type of the periodical (Printed, Electronic).
* **Methods**:
  + getType(): Returns the periodical type.
  + setType(String type): Sets the periodical type.

**2.5 Author**

* **Description**: Represents an author.
* **Attributes**:
  + name: The name of the author.
  + dateOfBirth: The date of birth of the author.
  + items: A list of items written by the author.
* **Methods**:
  + getName(): Returns the author name.
  + getDateOfBirth(): Returns the author date of birth.
  + getItems(): Returns the list of items written by the author.
  + setName(String name): Sets the author name.
  + setDateOfBirth(Date dateOfBirth): Sets the author date of birth.
  + addItem(LibraryItem item): Adds an item to the author's list.
  + removeItem(LibraryItem item): Removes an item from the author's list.

**2.6 Patron (Abstract Class)**

* **Description**: Represents a library patron.
* **Attributes**:
  + name: The name of the patron.
  + address: The address of the patron.
  + phoneNumber: The phone number of the patron.
  + borrowedItems: A list of borrowed items.
* **Methods**:
  + getName(): Returns the patron name.
  + getAddress(): Returns the patron address.
  + getPhoneNumber(): Returns the patron phone number.
  + getBorrowedItems(): Returns the list of borrowed items.
  + setName(String name): Sets the patron name.
  + setAddress(String address): Sets the patron address.
  + setPhoneNumber(String phoneNumber): Sets the patron phone number.
  + borrowItem(LibraryItem item): Adds an item to the borrowed list.
  + returnItem(LibraryItem item): Removes an item from the borrowed list.

**2.7 Student (Extends Patron)**

* **Description**: Represents a student patron.

**2.8 Employee (Extends Patron)**

* **Description**: Represents an employee patron.

**2.9 LibraryItemBorrowing**

* **Description**: Represents the action of borrowing a library item.
* **Attributes**:
  + patron: The patron who is borrowing the item.
  + item: The item being borrowed.
* **Methods**:
  + execute(): Executes the borrowing action.

**2.10 LibraryItemReturning**

* **Description**: Represents the action of returning a library item.
* **Attributes**:
  + patron: The patron who is returning the item.
  + item: The item being returned.
* **Methods**:
  + execute(): Executes the returning action.

**3. How to Start and Access the Application**

1. **Prerequisites**:
   * Ensure you have JDK installed on your system.
   * Install an IDE like IntelliJ IDEA or Eclipse.
2. **Steps to Run**:
   * Clone or download the source code.
   * Open the project in your IDE.
   * Compile and run the Main class.

**4. Class Diagram**

**A screenshot of a diagram

Description automatically generated**