**Exercise 2 -A library management system**

**AcademicStaff Class**

* **Thought Process:**  
  The AcademicStaff class is a subclass of the Person class, representing academic staff members who can borrow items like books and CDs. It contains an array borrowedItems to store up to three items. The borrowItem method ensures that only items of type Book or CD are borrowed, and the limit of three borrowed items is enforced.
* **Explanation:**
  + **Attributes:**
    - borrowedItems: An array that can hold up to three borrowed items.
    - itemCount: Keeps track of the current number of borrowed items.
  + **Methods:**
    - borrowItem(Item item): This method checks if the staff member has already borrowed three items and if the item is of the correct type (Book or CD). If both conditions are met, it adds the item to the borrowedItems array.

**Book Class**

* **Thought Process:**  
  The Book class extends the Item class and represents a specific type of item (a book) with additional attributes like name, publisher, and author. It overrides the displayDetails method to print the book's details.
* **Explanation:**
  + **Attributes:**
    - name, publisher, author: These hold the specific information for a book.
  + **Methods:**
    - displayDetails(): This method prints out the details of the book, including its name, publisher, and author.

**CD Class**

* **Thought Process:**  
  Similar to the Book class, the CD class is another subclass of Item and represents a CD item with a title attribute. It also overrides the displayDetails method to show the CD’s title.
* **Explanation:**
  + **Attributes:**
    - title: Stores the title of the CD.
  + **Methods:**
    - displayDetails(): Prints out the CD's title when called.

**Item Class (Abstract)**

* **Thought Process:**  
  The Item class is an abstract class that serves as a blueprint for other item classes like Book, CD, and Magazine. It holds common attributes like serialNumber, shelfNumber, and shelfIndex, which can be shared by all item subclasses.
* **Explanation:**
  + **Attributes:**
    - serialNumber, shelfNumber, shelfIndex: These hold information about the item’s serial number, shelf number, and shelf index.
  + **Methods:**
    - displayDetails(): An abstract method that is meant to be implemented by subclasses, as the display format will vary depending on the item type.

**Magazine Class**

* **Thought Process:**  
  The Magazine class is another subclass of Item and represents a magazine. It contains specific attributes for a magazine, such as name and publisher, and overrides the displayDetails method to print the magazine’s details.
* **Explanation:**
  + **Attributes:**
    - name, publisher: Specific to magazines, holding their name and publisher.
  + **Methods:**
    - displayDetails(): Prints out the details of the magazine, such as its name and publisher.

**Person Class (Abstract)**

* **Thought Process:**  
  The Person class is an abstract base class designed for both Student and AcademicStaff. It holds common attributes like name, surname, and uniqueNumber. The method borrowItem is abstract, meaning that each subclass (like Student and AcademicStaff) must define its own version of this method.
* **Explanation:**
  + **Attributes:**
    - name, surname, uniqueNumber: These are common properties of all persons, including students and staff.
  + **Methods:**
    - borrowItem(Item item): An abstract method, ensuring that subclasses implement the borrowing functionality for specific types of people.

**Student Class**

* **Thought Process:**  
  The Student class extends Person and represents a student who can borrow only one item at a time. It overrides the borrowItem method to ensure that only books and CDs can be borrowed by the student.
* **Explanation:**
  + **Attributes:**
    - borrowedItem: Keeps track of the single item borrowed by the student.
  + **Methods:**
    - borrowItem(Item item): This method allows the student to borrow an item if it is of type Book or CD. Only one item can be borrowed at a time.

**Tester Class**

* **Thought Process:**  
  The Tester class is the main class used to test the functionality of the other classes. It creates instances of Book, CD, Magazine, Student, and AcademicStaff, then simulates the borrowing of items. It tests the logic of item borrowing by different entities (students and staff) and prints the results.
* **Explanation:**
  + The Tester class demonstrates how different persons (student and academic staff) interact with various items (book, CD, magazine) and whether the borrowing rules are correctly enforced. It uses conditional checks to print messages indicating whether the borrowing process was successful or not.