Report: Coding Assignment 2

1. System Description

The Online Library Management System is a Python-based console application designed to streamline library operations through a role-based access system that serves Students, Teachers, and Librarians. The system enables users to authenticate with secure credentials, search and browse available books, and manage borrowing and returning operations with real-time availability tracking. Students can view simulated academic grades and request book recommendations tailored to their majors, Teachers can add course materials and monitor books borrowed by students in their subjects, while Librarians maintain comprehensive administrative control over both the book catalog and user registrations, ensuring efficient management of all library resources.

2. Agile Methodology Implementation

The Online Library Management System is a Python-based console application designed to streamline library operations through a role-based access system that serves Students, Teachers, and Librarians. The system enables users to authenticate with secure credentials, search and browse available books, and manage borrowing and returning operations with real-time availability tracking. Students can view simulated academic grades and request book recommendations tailored to their majors, Teachers can add course materials and monitor books borrowed by students in their subjects, while Librarians maintain comprehensive administrative control over both the book catalog and user registrations, ensuring efficient management of all library resources.

3. UML Diagrams Explained

The UML diagrams created for this project provide comprehensive visual documentation of the Library Management System's architecture and functionality. The Class Diagram (see Appendix A, figure 1) illustrates the system's object-oriented structure, showing inheritance relationships between the User base class and its Student, Teacher, and Librarian subclasses, along with their attributes and methods. The Use Case Diagram (see Appendix A, figure 2) depicts the system's functionality from the perspective of different actors, highlighting how Students, Teachers, and Librarians interact with various features such as book borrowing, course management, and administrative functions. The three sequence diagrams (see Appendix A, figures 3.1-3.3) capture dynamic interactions within the system, specifically demonstrating the processes for borrowing books, reviewing borrowed materials, and adding new resources to the library collection, showing the chronological flow of messages between objects during these key operations.

4. Appendix A

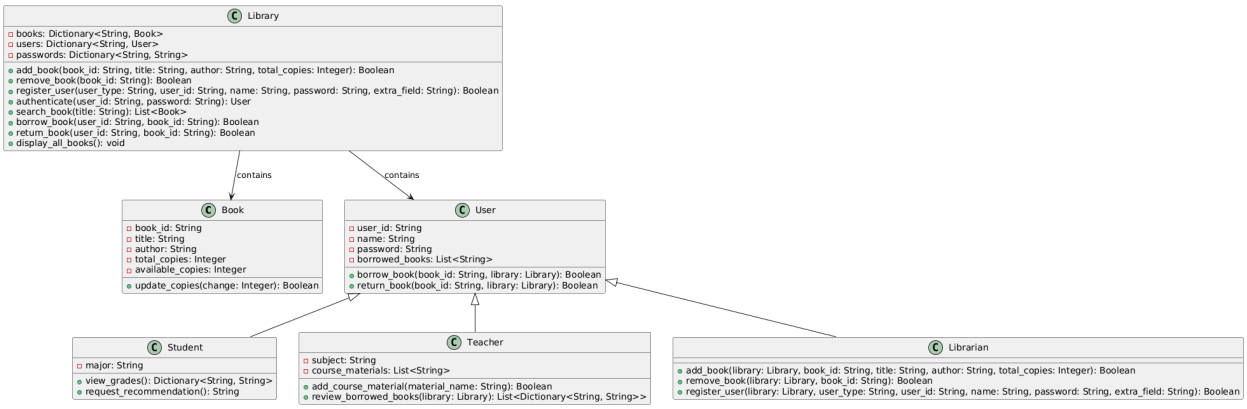

Figure 1

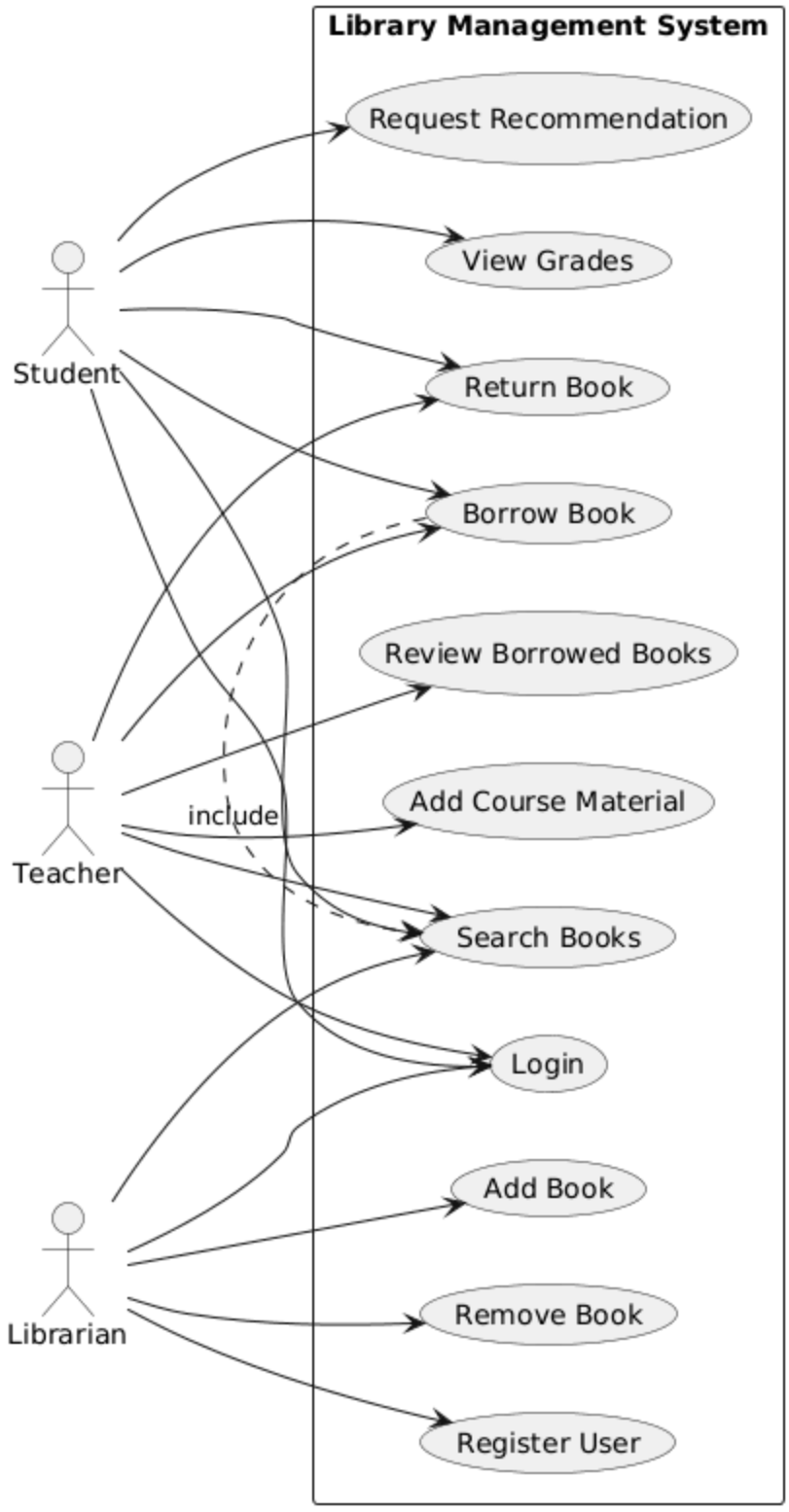
Library Management System
Request Recommendation
View Grades
Return Book
Borrow Book
Review Borrowed Books
Add Course Material
Search Books
Login
Add Book
Remove Book
Register User
Student
Teacher
Librarian
include

Figure 2

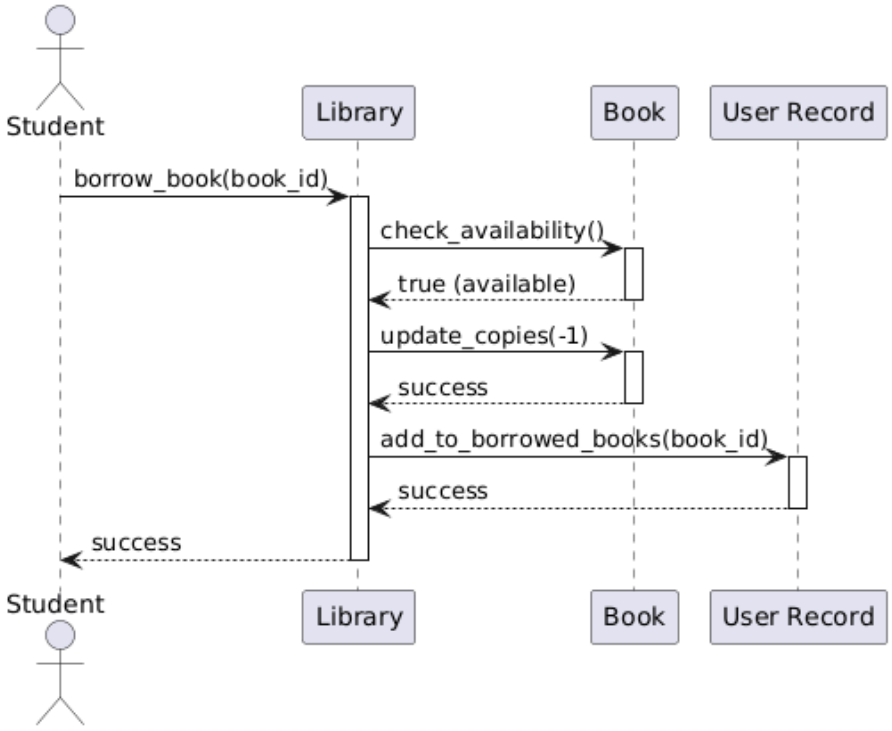

Figure 3.1

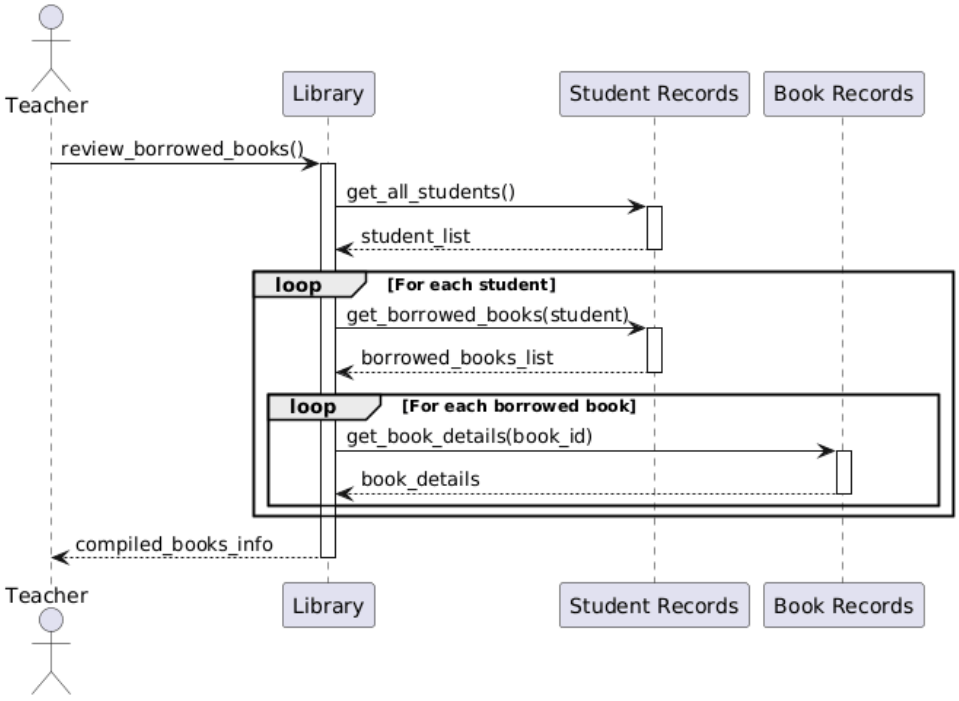

Figure 3.2

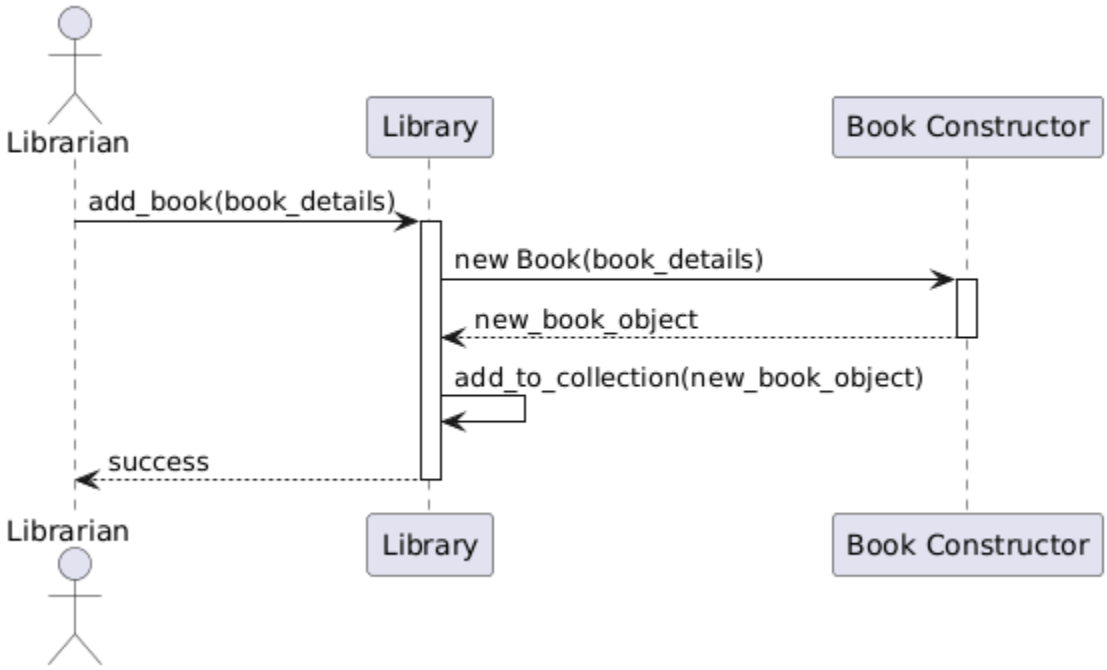
Librarian
Library
Book Constructor
add_book(book_details)
new Book(book_details)
new_book_object
add_to_collection(new_book_object)
success
Librarian
Library
Book Constructor

Figure 3.3

5. Appendix B

```
=== Online Library Management System ===
1. Login
2. Register
3. View All Books
4. Exit
Enter your choice: 1
Enter user ID: L001
Enter password: pass5
Authentication successful!

=== Online Library Management System ===
Logged in as: Librarian - ID: L001, Name: Ms. Linda Green
1. Add Book
2. Remove Book
3. Register User
4. Search Books
5. View All Books
6. Logout
7. Exit
Enter your choice: 1
Enter book ID: B004
Enter book title: Signals and Systems
Enter book author: Dr. James Wanliss
Enter total copies: 4
Book 'Signals and Systems' added successfully!

=== Online Library Management System ===
Logged in as: Librarian - ID: L001, Name: Ms. Linda Green
1. Add Book
2. Remove Book
3. Register User
4. Search Books
5. View All Books
6. Logout
7. Exit
Enter your choice: 5

=== All Books in Library ===
ID: B001, Title: Python Programming, Author: John Smith, Available: 3/5
ID: B002, Title: Data Structures, Author: Jane Doe, Available: 1/3
ID: B003, Title: Algorithms, Author: Robert Johnson, Available: 0/1
ID: B004, Title: Signals and Systems, Author: Dr. James Wanliss, Available: 4/4
```

Figure 1

```
=== Online Library Management System ===
Logged in as: Librarian - ID: L001, Name: Ms. Linda Green
1. Add Book
2. Remove Book
3. Register User
4. Search Books
5. View All Books
6. Logout
7. Exit
Enter your choice: 6
Logged out successfully!

=== Online Library Management System ===
1. Login
2. Register
3. View All Books
4. Exit
Enter your choice: 1
Enter user ID: T001
Enter password: pass4
Authentication successful!

=== Online Library Management System ===
Logged in as: Teacher - ID: T001, Name: Dr. Robert Brown, Subject: Computer Science
1. Add Course Material
2. Review Student's Borrowed Books
3. Search Books
4. Borrow Book
5. Return Book
6. View All Books
7. View My Borrowed Books
8. Logout
9. Exit
Enter your choice: 2
Reviewing books borrowed by students for subject Computer Science
Borrowed books by students:
{'student': 'Alice Johnson', 'book': 'Python Programming', 'author': 'John Smith'}
{'student': 'Alice Johnson', 'book': 'Data Structures', 'author': 'Jane Doe'}
{'student': 'Alice Johnson', 'book': 'Algorithms', 'author': 'Robert Johnson'}
{'student': 'Charlie Davis', 'book': 'Data Structures', 'author': 'Jane Doe'}
```

Figure 2

```
Logged in as: Teacher - ID: T001, Name: Dr. Robert Brown, Subject: Computer Science
1. Add Course Material
2. Review Student's Borrowed Books
3. Search Books
4. Borrow Book
5. Return Book
6. View All Books
7. View My Borrowed Books
8. Logout
9. Exit
Enter your choice: 8
Logged out successfully!

=== Online Library Management System ===
1. Login
2. Register
3. View All Books
4. Exit
Enter your choice: 1
Enter user ID: S002
Enter password: pass2
Authentication successful!

=== Online Library Management System ===
Logged in as: Student - ID: S002, Name: Bob Smith, Major: Mathematics
1. View Grades
2. Request Recommendation
3. Search Books
4. Borrow Book
5. Return Book
6. View All Books
7. View My Borrowed Books
8. Logout
9. Exit
Enter your choice: 4

=== All Books in Library ===
ID: B001, Title: Python Programming, Author: John Smith, Available: 3/5
ID: B002, Title: Data Structures, Author: Jane Doe, Available: 1/3
ID: B003, Title: Algorithms, Author: Robert Johnson, Available: 0/1
ID: B004, Title: Signals and Systems, Author: Dr. James Wanliss, Available: 4/4
Enter book ID to borrow: B004
Book 'Signals and Systems' borrowed successfully!
```

Figure 3

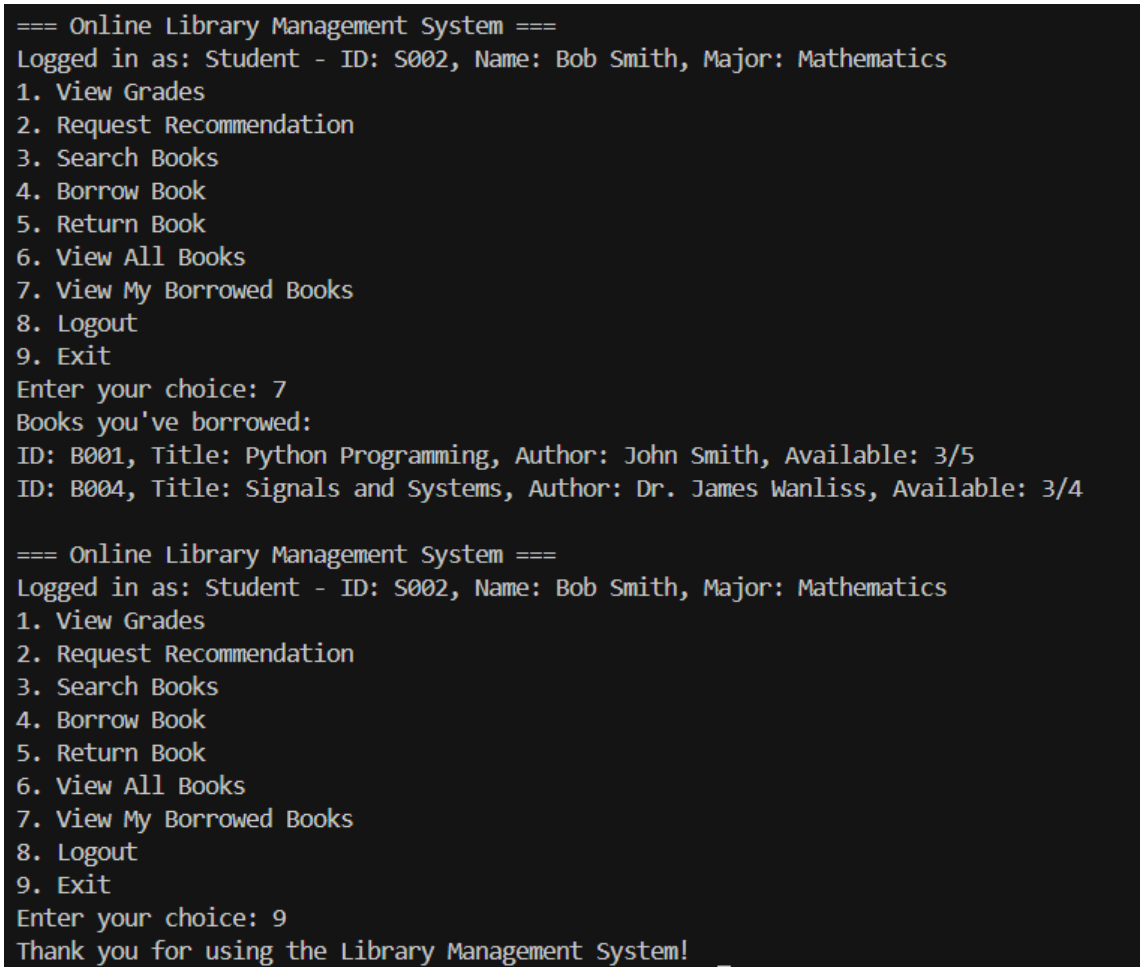
=== Online Library Management System ===
Logged in as: Student - ID: S002, Name: Bob Smith, Major: Mathematics
1. View Grades
2. Request Recommendation
3. Search Books
4. Borrow Book
5. Return Book
6. View All Books
7. View My Borrowed Books
8. Logout
9. Exit
Enter your choice: 7
Books you've borrowed:
ID: B001, Title: Python Programming, Author: John Smith, Available: 3/5
ID: B004, Title: Signals and Systems, Author: Dr. James Wanliss, Available: 3/4
=== Online Library Management System ===
Logged in as: Student - ID: S002, Name: Bob Smith, Major: Mathematics
1. View Grades
2. Request Recommendation
3. Search Books
4. Borrow Book
5. Return Book
6. View All Books
7. View My Borrowed Books
8. Logout
9. Exit
Enter your choice: 9
Thank you for using the Library Management System!

Figure 4