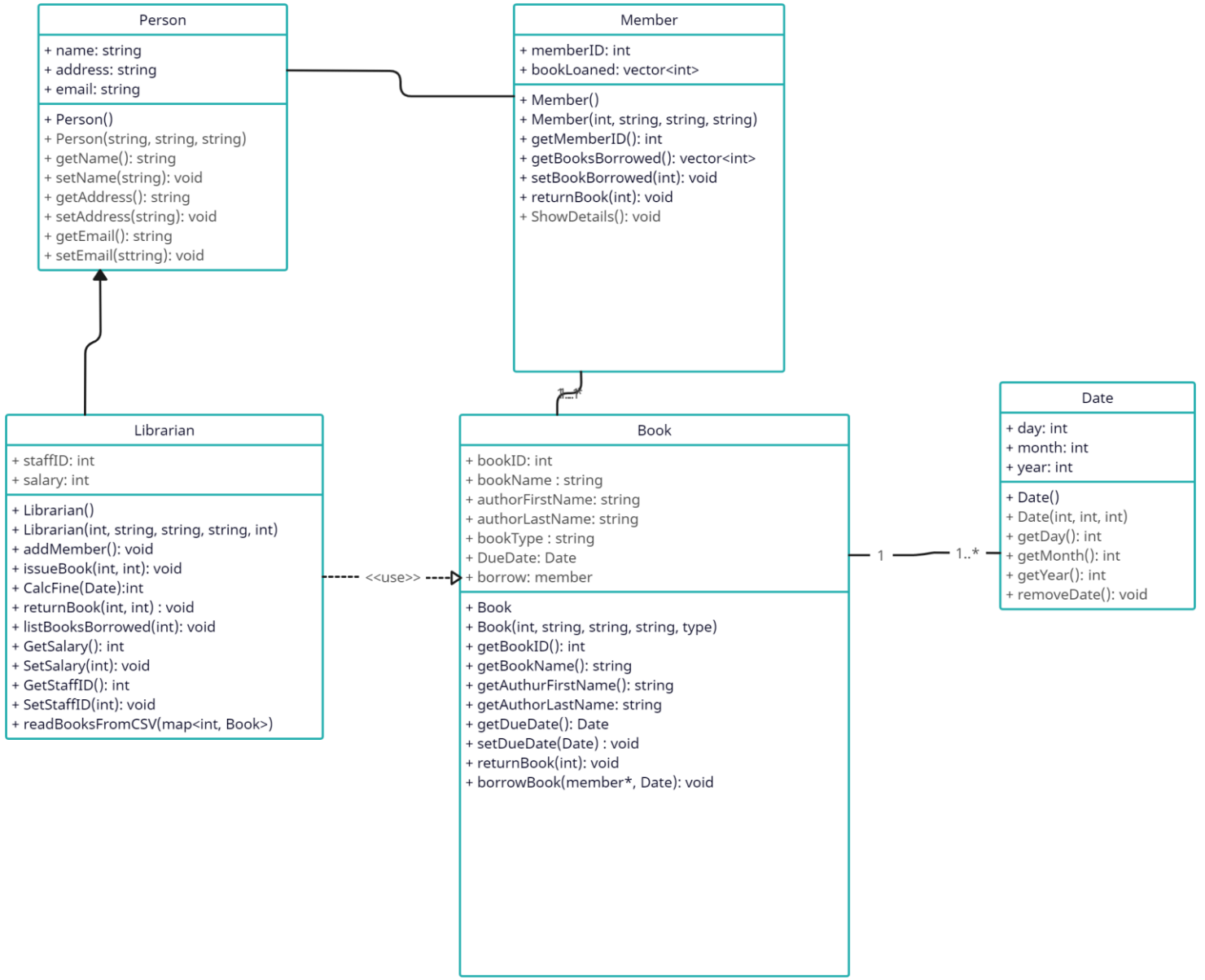
Introduction

- **Student Number:** M00912138

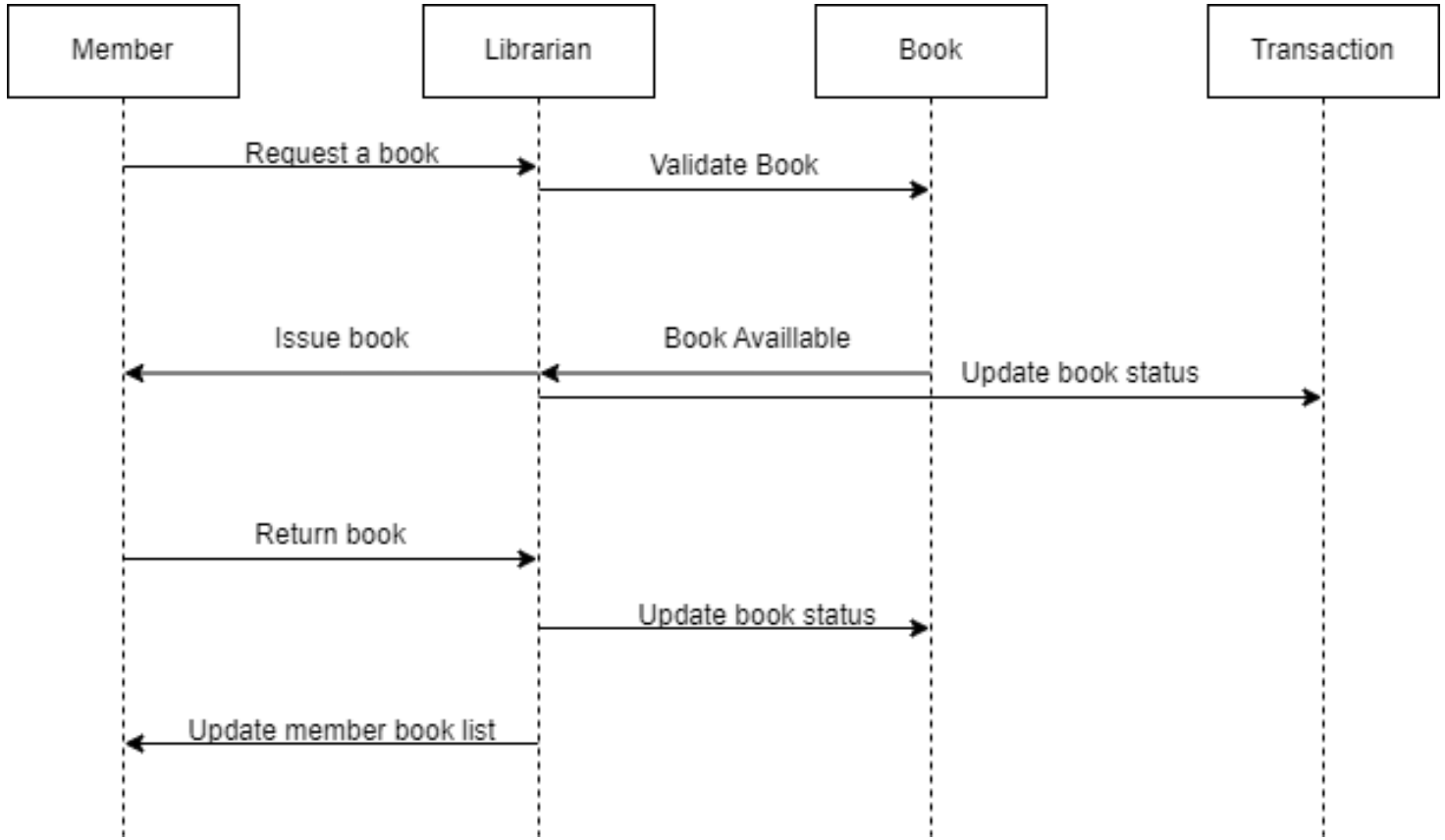
- **Project Description:**
  - The program is a library management system where librarians can add members, issue and return books, calculate fines for overdue books, and display borrowed books.
  - It employs object-oriented principles with classes such as Person, Librarian, Member, and Book.

Design

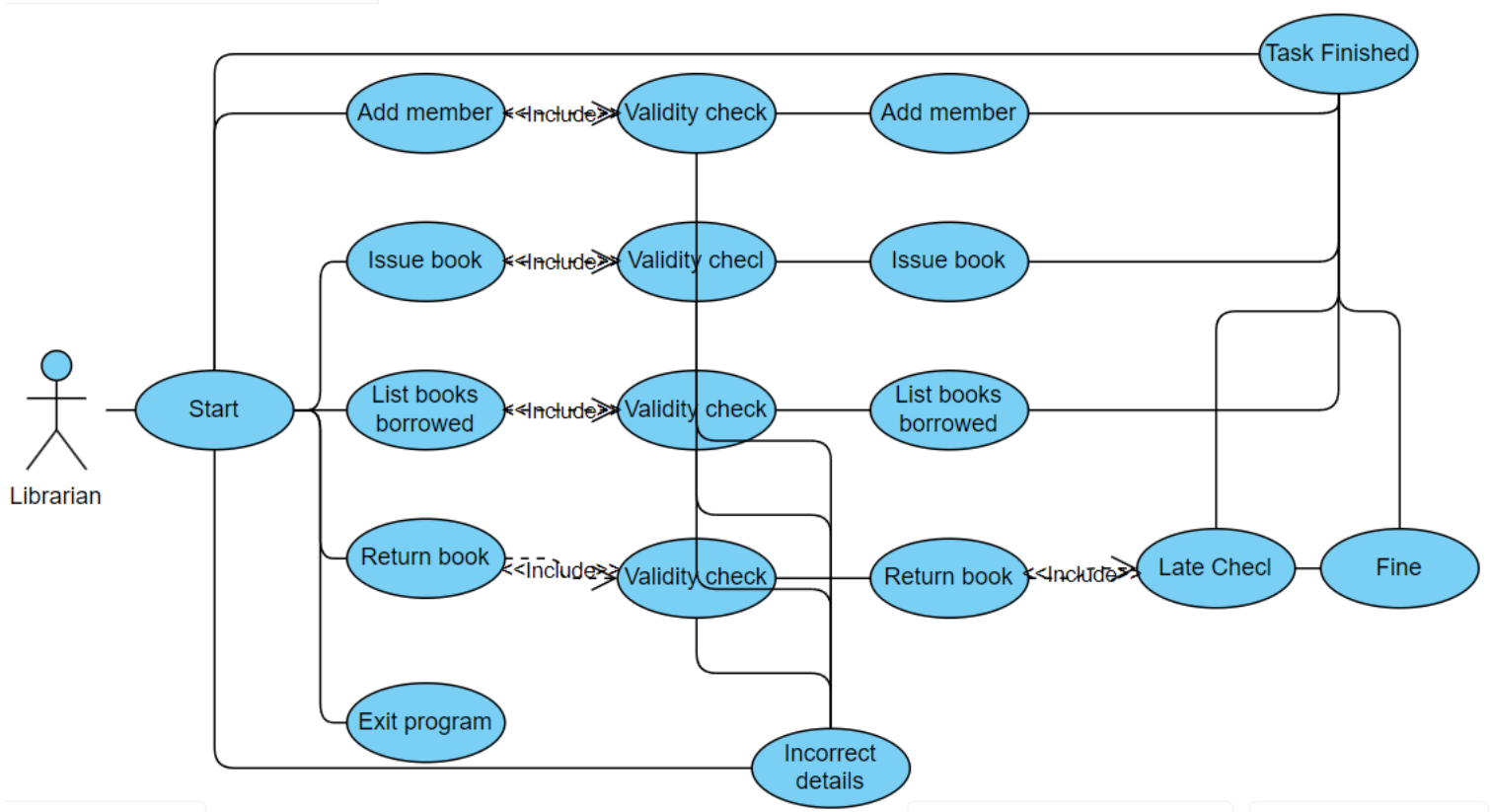
- Class Diagram



- Sequence Diagram



- Use Case Diagram



Implementation

Approach

- Create Class Files:
- Create separate header (.hpp) and implementation (.cpp) files for each class (**Person**, **Librarian**, **Member**, **Book, Date**).
- Define Class Attributes:
- In each class, define the attributes specified in the UML diagrams (**name**, **address**, **email**, **staffId**, **salary**, **memberId**, **booksLoaned**, etc.).
- Implement Constructors:
- Implement constructors in each class to initialize the attributes.
- Implement Setter and Getter Methods:
- Implement setter and getter methods for each attribute in the respective classes.
- Implement Member Functions:
- Implement member functions/methods as described in the UML diagrams for operations like adding members, issuing/returning books, calculating fines, etc.
- Handle Book Borrowing and Returning:
- Implement the borrowBook and returnBook methods in the Book class to handle the borrowing and returning of books by members.

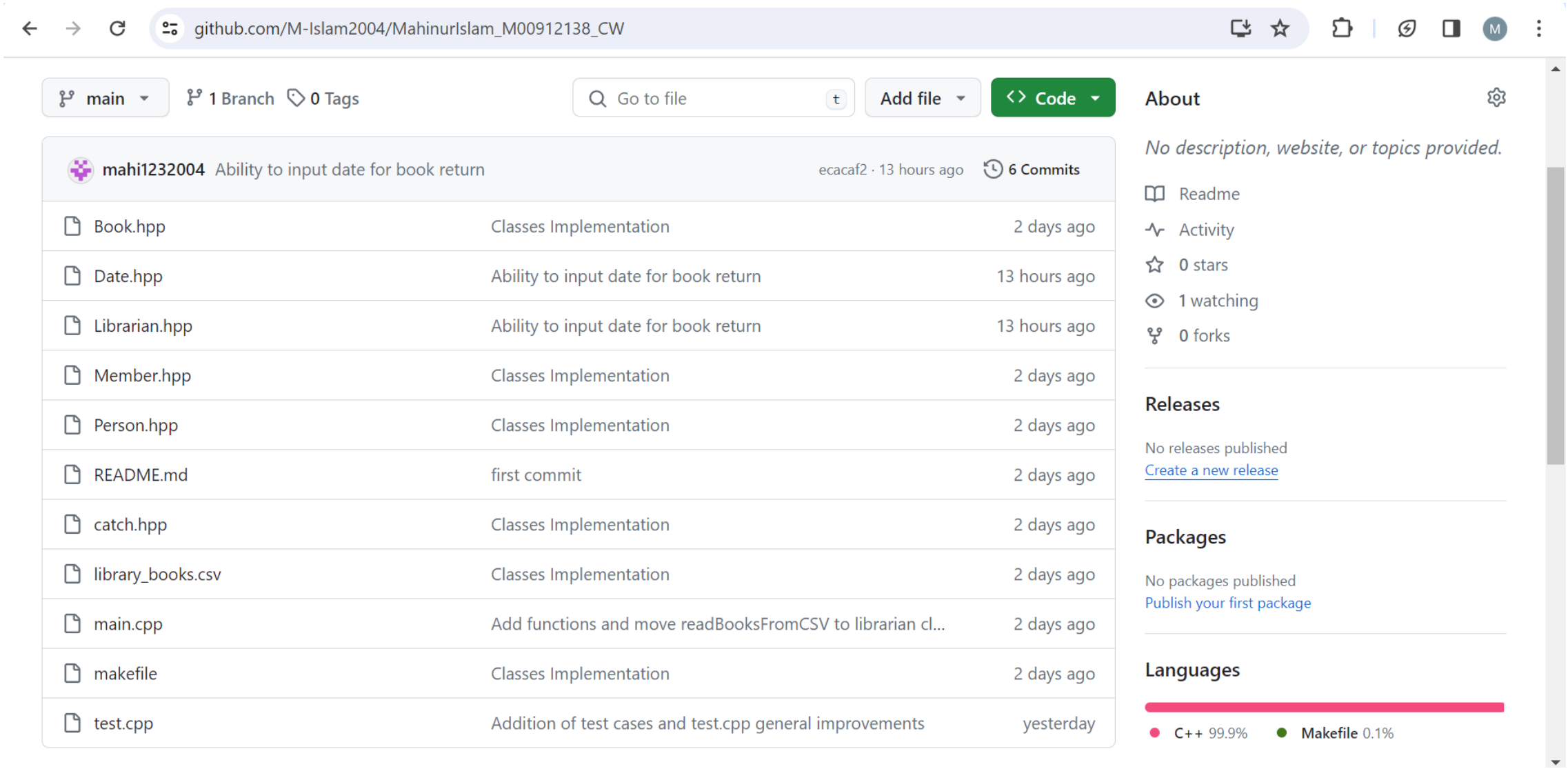
Makefile

- **CXX** is the C++ compiler, and **CXXFLAGS** are the compiler flags, including C++ standard and warning options.
- **SRC_DIR** is the directory containing the source code, and **BUILD_DIR** is the directory where object files will be stored.
- **SRCS** is a list of all source files, and **OBJS** is the corresponding list of object files.
- **EXECUTABLE (library)** is the name of the final executable.
- The all target depends on the $(**EXECUTABLE**) target, which depends on the object files. It compiles the source code into the executable.
- The rule to build each object file specifies the compilation command.
- The clean target removes all object files and the executable.

Version Control

- Github is used for version control.
- All the required the **cpp** and **hpp** files are pushed to repository.
- **Makefile** is also pushed to repo. **Presentation** will also be published after creation.

Repository Screenshot



Testing Approach

- Catch2 has been used for test cases.
- Multiple test cases has been defined in the test.cpp

Application of Approach

- **Test Case 1: Reading CSV File**: Verify the functionality of reading book details from a CSV file.
- **Test Case 2: Creating New Member** : Test the creation of new members with distinct details.
- **Test Case 3: Issuing Book**: Confirm the correct issuance of books to a member.
- **Test Case 4: List Books** : Validate the librarian's ability to list books borrowed by a member.
- **Test Case 5: Salary** : Assess the functionality of setting and getting the librarian's salary.
- **Test Case 6: StaffID** : Ensure the librarian's staff ID can be correctly set and retrieved.

Conclusion

- The presented project is a comprehensive library management system implemented in C++.
- Key features include the ability to read book details from a CSV file, create and display member information, issue and return books, and manage librarian details.
- The **Makefile** streamlines the build process, and version control is handled solely using Git/GitHub, however, could be improved with more commits more early on in development.
- The testing approach employs **Catch2** test cases to systematically validate functionalities such as **CSV** file reading, member creation, book issuance, and librarian information management.
- The project showcases a well-organized and modular design, ensuring effective management and accessibility of library resources.