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| Group D |
| Software Requirement Specifications |
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# Document Version

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| --- | --- | --- | --- | --- |
| No | Update | Name | Date | Version |
| 1. | Initial version | NA | NA | 1.0 |
| 2. | Added Requirements, flowcharts, purpose | Jie Hao | June 18 | 1.1 |
| 3. | Added UML diagrams | Lewis | June 20 | 1.2 |
| 4. | Added System Architecture, software architecture | Jian Zhi | June 29 | 1.3 |
| 5. | Updated UML diagrams, added Sequence Diagram, scope(1.3), | Leroy | June 30 | 1.4 |

# Purpose

## Intended Audience

This SRS document outlines the System Requirements and Software Design for a Library Book Reservation and Collection System. The intended audience is Singapore Polytechnic students who wish to borrow or return books to the library.

## Intended Use

The SRS defines the overall System Architecture and Requirements as well as the Software Architecture and Design. This document is also contains the definition of the System Requirements which shall be used as the input for System Test cases and Software Unit Test cases.

## Scope

The Library Book Reservation and Collection System we are designing streamlines the process of reserving, borrowing, and returning books within the Singapore Polytechnic library. The system aims to enhance user experience by providing a user-friendly interface and automating several manual processes. The scope of this project includes the following components:

1. User Registration and Authentication:

* Implementation of a secure user registration process.
* User authentication mechanisms to ensure authorized access to the system.

1. Book Search and Reservation:

* A search feature that allows users to find books by title, author, genre.
* Reservation functionality enabling users to reserve books online and receive notifications on availability.

1. Borrowing and Returning Books:

* System to manage book borrowing, including due dates and overdue notifications.
* Efficient book return process, including updates to the inventory and user accounts.

1. Inventory Management:

* Real-time tracking of the library's book inventory.
* Automatic updates to the inventory upon borrowing and returning of books.

## Definitions and Acronyms

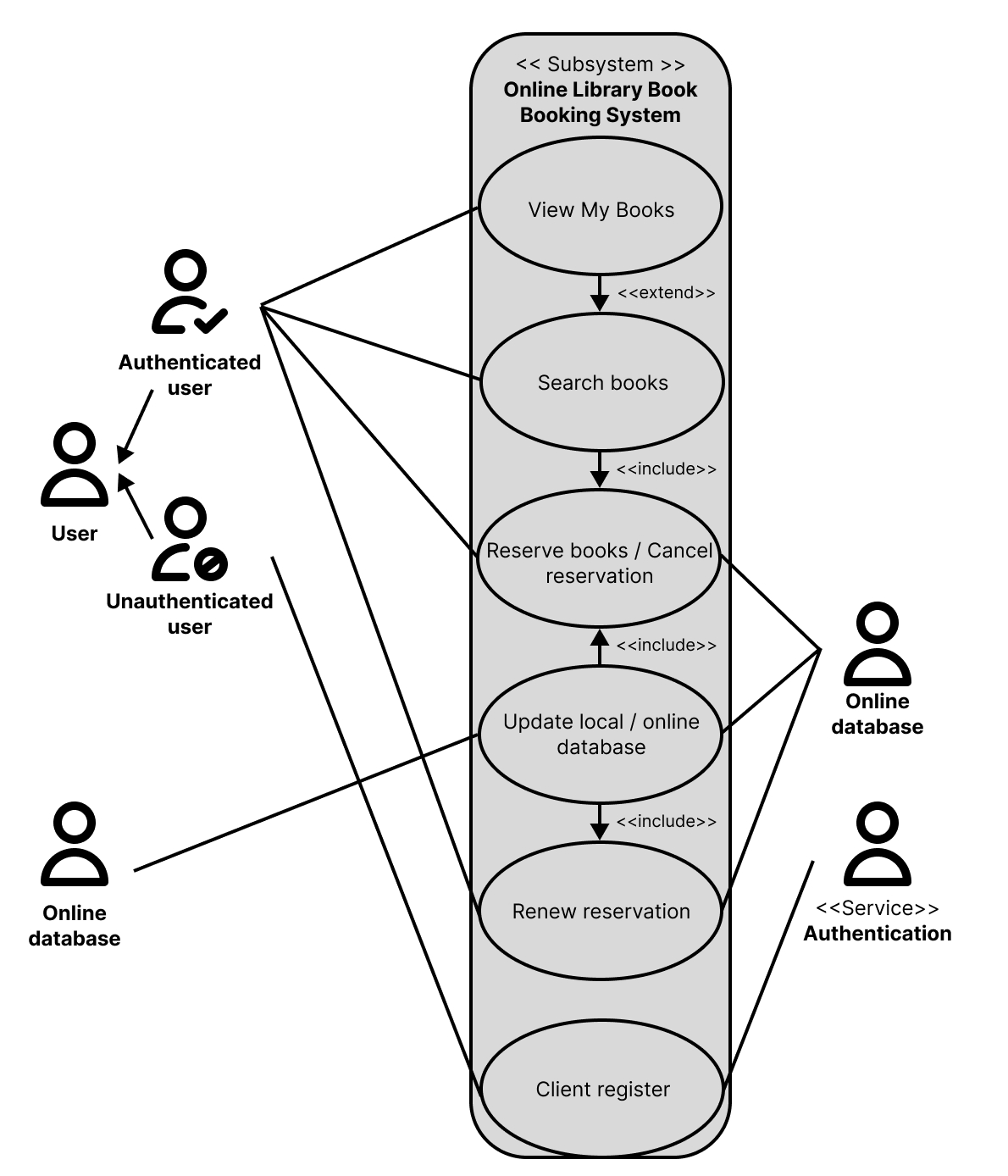
|  |  |
| --- | --- |
| **Acronym** | **Description** |
| NRIC | National Registration Identity Card |
| SP | Singapore Polytechnic |
| RFID | Radio-frequency identification |
| SW | Software |
| HW | Hardware |

# Overall System Description

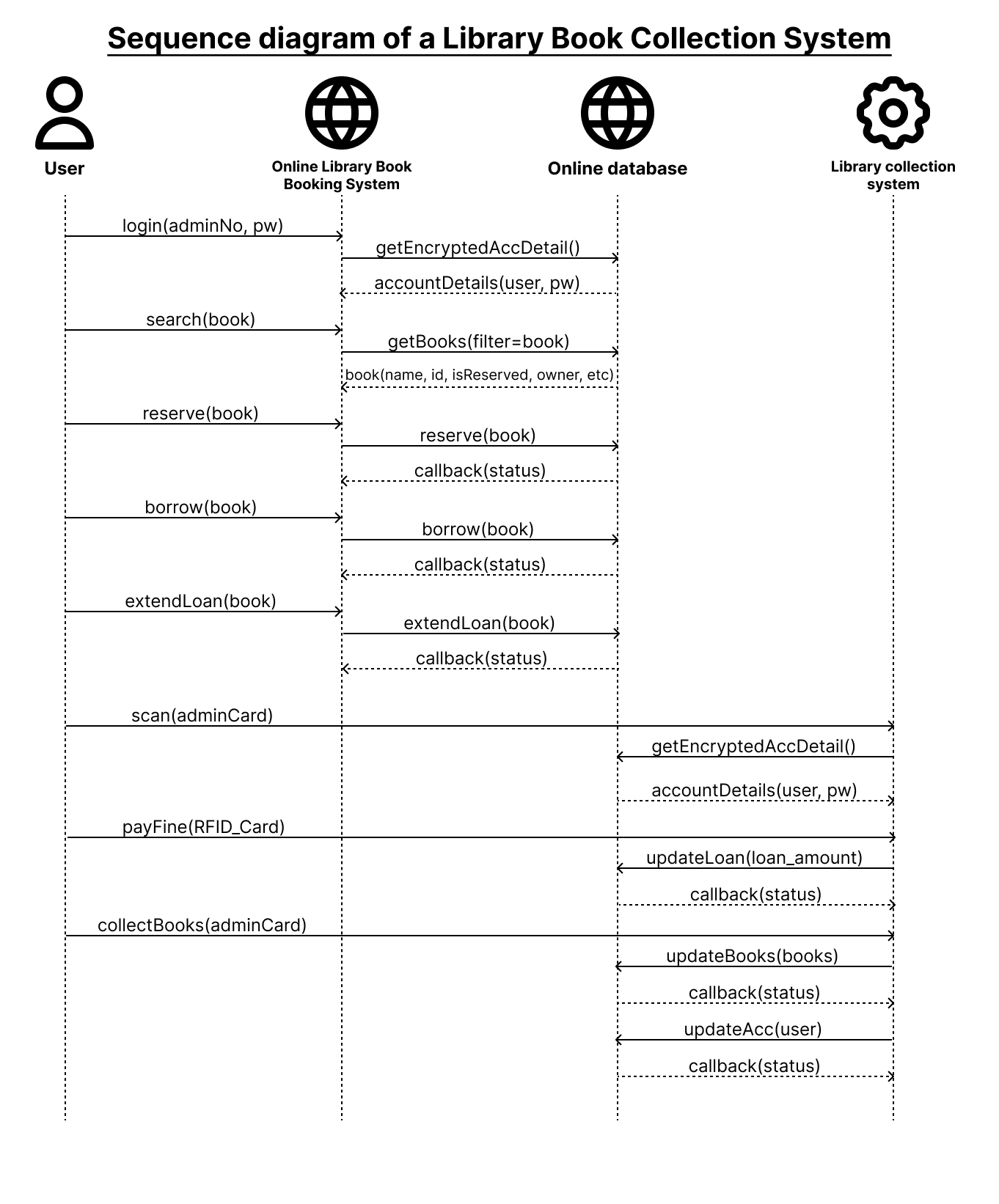
## [Use Case Diagrams](https://www.geeksforgeeks.org/use-case-diagram/)

Diagram of a library book collection system

Description automatically generated



## Sequence Diagrams



## System Architecture



DC Motor

LCD

I2C

**Raspberry Pi Development Board**



RFID Scanner

Camera

PWM

GPIO

SPI

CSI camera connectors

## Functional Requirements

### Function Reserving Books

To allow users to reserve books using the system.

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-01 | The system will allow the user to reserve books via a website or Mobile app. |
| REQ-02 | If reserved books are not collected within 5 days from reserved date, it is automatically cancelled. |
| REQ-03 | The user can select library branch to reserve books from. |

### Function Collecting Books

To allow users to collect reserved books.

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-04 | User can collect books reserved from the system implementing the flowchart defined in Figure 1. |

REQ-05

Start

Scan SP student card or NRIC at RFID scanner

REQ-06

Is the card valid?

No

REQ-08

Yes

REQ-07

Does user have outstanding fines?

Pay fine

No

REQ-09

Dispense Book

End

**Figure 1**

### Function Borrowing Books

1. Allows user to borrow books

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-10 | They system will allow user to borrow a maximum of 10 books. |

### Function collecting fines

1. Allows user to borrow books

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-11 | Users must pay any outstanding fines at the machine using the RFID card reader before being allowed to collect their book reservations |
| REQ-12 | A fine of $0.15 per book each day after return date |

### Function Loan Periods

1. The time loaned to users per book

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-13 | Each book has a loan period of 18 days |
| REQ-14 | Each book can be renewed only once for an additional 7 days. |

## Non-Functional Requirements

### Non-Functional Requirement xxxx

Add short description here …

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-xx |  |
| REQ-xx |  |

# Software Architecture

## Static Software Architecture

The Software Architecture defines the various Software Components that are developed to realize the implementation of the system requirements.

**PowerMgt**

**HMI**

**Application Layer**

**Hardware Abstraction Layer (HAL)**

**ADC**

**NFC**

**Servo**

**BlackCoffee**

**HotWater**

**Camera**