

Software Requirements Specification (SRS)

Project: Library Management System (LMS)

Standard: IEEE 830 (superseded by ISO/IEC/IEEE 29148)

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1. Introduction

1.1 Purpose of this document

This SRS specifies the requirements for the Library Management System (LMS). It is written for stakeholders including Students, Librarians, Manager, Stock Manager, Accountant, Supplier. It defines functional, non-functional, interface, data and constraints requirements to be used as the baseline for design, implementation, testing, and acceptance.

1.2 Scope of the product

The LMS digitizes core library operations: searching, borrowing, returning, fine calculation & payment, user account management, acquisition (ordering/receiving) of new books, and reporting. The system interfaces with internal roles (Student, Librarian, Manager, Stock Manager, Accountant) and an external Supplier. It maintains catalogue and circulation data, enforces borrowing policies (e.g., two-week loan, late fines), issues purchase orders for out-of-stock titles, and records deliveries.

1.3 Definitions, acronyms, abbreviations

- **LMS** — Library Management System.
- **UCD** — Use Case Diagram.
- **DFD** — Data Flow Diagram (Level-0).
- **FR** — Functional Requirement.
- **NFR** — Non-Functional Requirement.
- **PO** — Purchase Order.
- **Actor** — External entity interacting with the system: Student, Librarian, Manager, Stock Manager, Accountant, Supplier.
- **Borrowing period** — Default loan duration of 14 calendar days unless otherwise configured.

1.4 References

1. Use Case Diagram.
2. Data Flow Diagrams.
3. IEEE Std 830-1998 / ISO/IEC/IEEE 29148:2018 (structure followed).

1.5 Overview of the remainder of this document

Section 2 of SRS provides a product overview (context, users, functions, constraints, assumptions). Section 3 of SRS details specific, testable requirements including functional, interface and non-functional requirements. Section 4 contains appendices and index.

2. General Description

2.1 Product perspective

The LMS is a centralized information system accessed via a web UI by internal users and exposed to the Supplier via notifications/documents. It integrates circulation (issue/return), catalogue management, fines, user accounts, and acquisitions of books.

Context (from UCD/DFD):

- **Student** searches catalogue, receives availability lists, borrows/returns books, views history and payment slips, and pays late fines.
- **Librarian** oversees the whole Library Management System.
- **Manager** issues and collects books, manages student accounts.
- **Stock Manager** adds book data, raises order requests when low stock, receives stock alerts and order confirmations.
- **Accountant** receives fine reports and payment acknowledgements, issues payment confirmation receipts.
- **Supplier** receives PO/order requisition and provides delivery copy upon supplying books; LMS acknowledges receipt.

2.2 Product functions (high level)

- F1. Catalogue search and book availability listing.
- F2. Borrow/issue and return processing with due-date and hold rules.
- F3. Borrowing history and account overview.
- F4. Fine assessment for overdue items and payment processing.
- F5. Student account management (activate/disable, update contact, reset password).
- F6. Stock management: add/update book records, stock alerts.
- F7. Acquisition: create PO, send to Supplier, receive delivery, acknowledge receipt, update inventory.
- F8. Reporting: fine reports, daily issue/return summaries, stock levels.

2.3 User characteristics

- **Students:** Basic web literacy; may access via mobile or desktop.
- **Librarian/Manager/Stock Manager/Accountant:** Trained staff; access via secure desktop or tablet; require role-based privileges.
- **Supplier:** External organization; interacts through emailed PO and delivery documentation; no interactive login required initially.

2.4 General constraints

- University network policies; SSO or role-based authentication.
- Data privacy/regulatory: protect personally identifiable information (PII).
- Working hours for physical issue/return; payments may use integrated gateway or manual acknowledgement by Accountant.
- Max borrowing period defaults to 14 days; fines accrue after due date.
- System must operate on commodity servers/browsers specified in §3.3.

2.5 Assumptions and dependencies

- Reliable and constant internet connectivity for library staff and patrons.
- Email service available for PO dispatch and notifications.
- Payment gateway or UPI/card entry available for fines.
- Supplier acknowledges orders via delivery copy.

3. Specific Requirements

Note: Requirement IDs are atomic and testable. Priority: (H)igh, (M)edium, (L)ow.

3.1 Functional requirements (FR)

Catalogue & Search

- **FR-1 (H):** The system shall allow Students and staff to search books by title, author, book_ID, subject, and keywords.
- **FR-2 (H):** The system shall display an availability list showing number of copies, and current hold/loan status.

Borrow/Issue & Return

- **FR-3 (H):** A Manager shall issue/collect a book to/from a Student.
- **FR-4 (H):** The system shall prevent issuing a book to a student if any of the following conditions are met:
 - The student has outstanding fines that exceed a configured threshold.
 - The student's account is currently blocked.
 - The student has already issued the maximum number of books allowed, which is four.
- **FR-5 (H):** The system shall record the return of a book and update inventory status immediately.

- **FR-6 (M):** The system shall support due-date extensions/renewals according to policy (e.g., one renewal if no holds).

Borrowing History & Accounts

- **FR-7 (M):** The system shall allow Students to view their borrowing history and current loans.
- **FR-8 (M):** Managers and Librarians shall view Student account details, borrowing history, and status.
- **FR-9 (M):** Librarians shall manage Student accounts (activate, deactivate, and update info).

Fines & Payments

- **FR-10 (H):** The system shall calculate overdue fines when a book is kept beyond the due date, using a configurable per-day rate.
- **FR-11 (H):** The system shall generate a payment slip for the student when fines are due.
- **FR-12 (H):** The system shall record fine payment and produce a payment confirmation receipt for the student and an acknowledgement for the accountant.
- **FR-13 (M):** The system shall allow the Accountant and Librarian to view daily fine reports.

Stock & Catalogue Management

- **FR-14 (H):** The Stock Manager shall add new book metadata (title, author, book_ID, subject, copies, supplier, price) and update existing records.
- **FR-15 (M):** The system shall trigger a stock alert when available copies fall below a configurable threshold.

Acquisitions (Orders & Receiving)

- **FR-16 (M):** The Stock Manager shall create a purchase order (PO) for new/low-stock books.
- **FR-17 (M):** The system shall send PO/order requisition to the Supplier and record order status.
- **FR-18 (M):** Upon delivery, the system shall record the delivery copy, update inventory, and allow acknowledgement of books received.
- **FR-19 (L):** The system shall notify the Stock Manager of order confirmations and expected delivery dates.

Notifications & Receipts

- **FR-20 (M):** The system shall send request confirmations for borrow/return actions and email reminders for due/overdue items.

Reporting & Audit

- **FR-21 (M):** The system shall provide reports: daily issues/returns, fines collected, stock levels, and outstanding orders.
- **FR-22 (M):** The system shall maintain an immutable audit log for critical actions (issue, return, fine payment, PO lifecycle).

3.2 Non-functional requirements (NFR)

Security & Privacy

- **NFR-1 (H):** Enforce authentication and role-based authorization for all functions.
- **NFR-2 (H):** Protect metadata and loan data at rest (database encryption) and in transit (HTTPS/TLS).

Performance & Capacity

- **NFR-3 (M):** Search queries shall return initial results within 2 seconds on recommended hardware.
- **NFR-4 (M):** Issue/return operations shall complete within 3 seconds under normal load.

Availability & Reliability

- **NFR-5 (M):** System availability $\geq 99\%$ during library working hours.

Usability

- **NFR-6 (M):** Interfaces shall be accessible.

Maintainability & Portability

- **NFR-7 (M):** Source code shall follow documented coding standards and include automated tests for critical paths.

Compliance

- **NFR-8 (M):** Comply with institutional data retention and privacy policies.

3.3 External interface requirements

3.3.1 User Interfaces

- **UI-1:** Responsive web interface for Students and staff, accessible via modern browsers.
- **UI-2:** Role-based menus: Student (e.g. **Search, My Loans, Pay Fines**), Librarian (e.g. **Issue/Return, Fines, Accounts**), Manager (e.g. **Accounts, Reports**), Stock Manager (e.g. **Catalogue, Orders, Alerts**), Accountant (e.g. **Payments, Reports**).
- **UI-3:** Printable artefacts: payment slips, receipts, POs, delivery acknowledgements.

3.3.2 Software Interfaces

- **SW-1:** Email/SMTP service to dispatch POs and notifications.
- **SW-2:** Payment gateway API (or manual payment entry module).
- **SW-3:** Relational DBMS (e.g., PostgreSQL/MySQL).

3.3.4 Communications Interfaces

- **COM-1:** HTTPS for all client–server communications.
- **COM-2:** Outbound SMTP over TLS.

4. Appendices

A. Quality attribute scenarios

- **Security:** If an unauthorized user attempts to access payment reports, the system denies access and logs the event with IP, userID, timestamp.
- **Reliability:** If the DB server fails, recovery time objective (RTO) ≤ 4 hours using daily backups.

B. Sample data dictionary (abbrev.)

Book Catalogue(bookID PK, title, author, subject, publisher, year, copiesTotal, copiesAvailable)

Member Database(memberID PK, name, email, phone, address, membershipDate, status)

Borrow Record(borrowID PK, itemID FK, borrowerID FK, issueDate, dueDate, returnDate)

Fine Records(fineID PK, loanID FK, ratePerDay, amount, status)

Order Records(poID PK, supplierID FK, orderDate, status)

C. Figure references (provided separately)

- Use Case Diagram.
- Data Flow Diagrams.

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