

Prioritized Product Backlog

for

Library Management System

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1 Introduction

1.1 Purpose

This Prioritized Product Backlog document outlines the detailed user stories for the Library Management System (LMS), derived from the Software Requirements Specification (SRS) prepared by Team Innovators. Each user story is assigned a priority level—High, Medium, or Low—to facilitate iterative development, ensuring that critical functionalities are delivered first. This aligns with Software Engineering principles (e.g., Agile prioritization) and IEEE 830-1998 standards for requirements specification and traceability.

1.2 Scope

The backlog covers the full spectrum of LMS functionalities, including user registration, authentication, book catalog management, borrowing and returning processes, overdue management, automated notifications, and administrative reporting. Priorities reflect stakeholder needs (students, librarians, administrators), system dependencies, and operational impact, ensuring a Minimum Viable Product (MVP) in early sprints followed by enhancements.

1.3 References

- IEEE 830-1998: IEEE Recommended Practice for Software Requirements Specifications
- Library Management System SRS (Team Innovators), Version 1.0, March 07, 2025

2 Product Backlog

2.1 Overview

This section lists all user stories with comprehensive details, including descriptions, acceptance criteria, traceability to the SRS, estimated effort, risks, and prioritization rationale. Priorities are defined as:

- High (**Red**): Essential features for core system functionality and user interaction, critical for MVP.
- Medium (**Orange**): Features that enhance usability and operational efficiency, scheduled after core functionality.
- Low (**Green**): Supplementary features that add value but are not urgent.

Effort is estimated in story points (Fibonacci scale: 1, 2, 3, 5, 8, 13) based on complexity and implementation time.

2.2 User Stories

1. US1: User Registration [High Priority]
 - Description: As a student, I want to register an account so that I can access the library system and its features.
 - Acceptance Criteria:
 - The registration page is accessible via the LMS web interface.
 - The form requires name, student ID, email, and password (minimum 8 characters, alphanumeric).
 - System validates student ID against the university database and ensures email uniqueness.
 - Upon successful submission, an account is created, and a confirmation email with a verification link is sent within 10 seconds.
 - Error messages display for invalid inputs (e.g., duplicate email, invalid ID).
 - Traceability: SRS Section 3.2, Item 1
 - Effort Estimate: 5 story points
 - Risks: Dependency on university database availability; potential delays in SMTP service integration.
 - Rationale: Critical for enabling student access, a foundational feature for all subsequent interactions.
2. US2: User Authentication [High Priority]
 - Description: As a user (student, librarian, or administrator), I want to log in to the system so that I can securely access my authorized features.
 - Acceptance Criteria:
 - Login page accepts username (email) and password.
 - System authenticates credentials using encrypted storage (e.g., SHA-256 hashing).
 - Successful login redirects to role-specific dashboards (student, librarian, admin) within 2 seconds.
 - Failed attempts display "Invalid credentials" and lock the account after 5 tries for 10 minutes.
 - Session timeout occurs after 30 minutes of inactivity.
 - Traceability: SRS Section 3.2, Item 2
 - Effort Estimate: 5 story points
 - Risks: Security vulnerabilities if encryption is misconfigured; integration issues with university database authentication.
 - Rationale: Essential for security and role-based access, underpinning all system operations.
3. US3: Book Search [High Priority]

- Description: As a student, I want to search for books so that I can locate items I need for study or research.
- Acceptance Criteria:
 - Search page offers fields for title, author, genre, and a "Show Available Only" filter.
 - System returns results matching any combination of criteria within 2 seconds.
 - Results list displays title, author, ISBN, and availability status (e.g., "Available," "Borrowed").
 - Supports up to 500 concurrent searches without performance degradation.
 - Pagination handles large result sets (e.g., 10 books per page).
- Traceability: SRS Section 3.2, Item 3
- Effort Estimate: 8 story points
- Risks: Performance bottlenecks under high load; incomplete book data affecting search accuracy.
- Rationale: Core feature for students, critical for usability and system purpose.

4. US4: Book Borrowing [High Priority]

- Description: As a student, I want to borrow a book so that I can take it home for studying or research.
- Acceptance Criteria:
 - Student selects an available book from search results or catalog.
 - "Borrow" button initiates the process, prompting confirmation.
 - System checks availability, updates status to "Borrowed," and creates a transaction record with a 14-day due date.
 - Student receives a confirmation email with book details and due date.
 - Borrowing fails if the student has reached a limit (e.g., 5 books).
- Traceability: SRS Section 3.2, Item 4
- Effort Estimate: 5 story points
- Risks: Race conditions with concurrent borrowing requests; email delivery delays.
- Rationale: Fundamental library function, necessary for MVP.

5. US5: Book Returning [High Priority]

- Description: As a student, I want to return a book so that I can avoid overdue fines and free up my borrowing limit.
- Acceptance Criteria:
 - Student views their borrowed books in a dashboard list.
 - "Return" button updates book status to "Available" and closes the transaction record.
 - System checks for overdue status and notifies the student if fines apply.

- Confirmation is displayed and emailed to the student.
 - Return process completes within 2 seconds.
- Traceability: SRS Section 3.2, Item 5
- Effort Estimate: 3 story points
- Risks: Incorrect status updates if database sync fails; overdue calculation errors.
- Rationale: Completes the borrowing cycle, critical for operational flow.

6. US6: Add Book [Medium Priority]

- Description: As a librarian, I want to add a book to the inventory so that it becomes available for students to borrow.
- Acceptance Criteria:
 - Librarian accesses a "Manage Inventory" page.
 - Form accepts title, author, ISBN, genre, and optional fields (e.g., publication year).
 - System validates ISBN uniqueness and required fields.
 - Book is added with status "Available," and a confirmation is displayed.
 - Supports batch upload via CSV for multiple books.
- Traceability: SRS Section 3.2, Item 6
- Effort Estimate: 5 story points
- Risks: Data entry errors affecting catalog accuracy; CSV parsing issues in batch upload.
- Rationale: Key for inventory growth, but can follow student-facing features.

7. US7: Update Book [Medium Priority]

- Description: As a librarian, I want to update book information so that the catalog reflects accurate and current details.
- Acceptance Criteria:
 - Librarian selects a book from the inventory list.
 - Editable fields include title, author, ISBN, genre, and status.
 - System validates changes (e.g., ISBN remains unique if altered).
 - Updated details are saved, and a confirmation is shown.
 - Audit log records the update with timestamp and librarian ID.
- Traceability: SRS Section 3.2, Item 6
- Effort Estimate: 3 story points
- Risks: Data overwrite errors if concurrent edits occur; audit log storage overhead.
- Rationale: Maintains catalog integrity, important but not urgent.

8. US8: Remove Book [Medium Priority]

- Description: As a librarian, I want to remove a book from the inventory so that outdated or lost items are no longer listed.
- Acceptance Criteria:
 - Librarian selects a book and clicks "Remove."
 - System checks if the book is borrowed; if so, removal is blocked with an error.
 - Confirmation prompt requires approval to proceed.
 - Book is deleted from the inventory, and a log entry is created.
 - Success message confirms removal.
- Traceability: SRS Section 3.2, Item 6
- Effort Estimate: 3 story points
- Risks: Accidental deletion of active books; log entry failures.
- Rationale: Supports inventory maintenance, but less critical than core operations.

9. US9: Manage Overdues

[Medium Priority]

- Description: As a librarian, I want to manage overdue books and fines so that I can enforce timely returns and maintain library policies.
- Acceptance Criteria:
 - "Overdue Management" page lists overdue books with student name, book title, due date, and days overdue.
 - System calculates fines at \$0.50 per day past due, up to a \$10 maximum.
 - Librarian can send overdue notices via email with fine details.
 - Fines are applied to student accounts upon confirmation.
 - Overdue list updates in real-time as books are returned.
- Traceability: SRS Section 3.2, Item 7
- Effort Estimate: 8 story points
- Risks: Incorrect fine calculations due to date errors; email notification failures.
- Rationale: Enhances policy enforcement, but depends on borrowing/returning.

10. US10: Generate Reports

[Low Priority]

- Description: As an administrator, I want to generate reports so that I can analyze library usage and make informed decisions.
- Acceptance Criteria:
 - "Reports" page offers options: Borrowing Statistics, Overdue Summary, Inventory Status.
 - System generates a PDF report with charts (e.g., bar graph of borrowings) within 5 seconds.
 - Reports include date range filters and export functionality.
 - Data reflects real-time database state.

- Access restricted to administrators.
- Traceability: SRS Section 3.2, Item 8
- Effort Estimate: 13 story points
- Risks: Performance issues with large datasets; chart generation library compatibility.
- Rationale: Valuable for analytics, but not essential for initial deployment.

11. US11: Monitor Performance [Low Priority]

- Description: As an administrator, I want to monitor system performance so that I can ensure reliability and uptime.
- Acceptance Criteria:
 - "Performance Dashboard" displays metrics: uptime, average response time, concurrent users.
 - Data refreshes every 30 seconds.
 - Alerts trigger if uptime drops below 99.5% or response exceeds 3 seconds.
 - Historical data available for the past 30 days.
 - Access restricted to administrators.
- Traceability: SRS Section 3.3.1
- Effort Estimate: 13 story points
- Risks: Resource overhead from continuous monitoring; alert system false positives.
- Rationale: Enhances maintenance, but deferrable until core system is stable.

12. US12: Due Date Reminders [Medium Priority]

- Description: As a student, I want to receive automated due date reminders so that I can return books on time and avoid fines.
- Acceptance Criteria:
 - System schedules an email 2 days before each book's due date.
 - Email contains book title, due date, return instructions, and a link to the return page.
 - Reminders are logged in the system with send status (success/failure).
 - Students can opt out of reminders via profile settings.
 - Handles up to 500 daily reminders without delay.
- Traceability: SRS Section 3.2 (Additional Requirement)
- Effort Estimate: 5 story points
- Risks: Email server overload with high volume; scheduling errors missing reminders.
- Rationale: Improves user experience and reduces overdue, but builds on borrowing.

3 Prioritization Summary

3.1 Priority Breakdown

- High Priority (5 Stories): US1, US2, US3, US4, US5
 - Total Effort: 26 story points
 - Details: These stories form the core of the LMS, enabling user access (registration, authentication) and primary library functions (search, borrow, return). They are essential for the MVP to meet stakeholder needs and operational requirements.
- Medium Priority (5 Stories): US6, US7, US8, US9, US12
 - Total Effort: 24 story points
 - Details: These enhance inventory management (add, update, remove books), enforce policies (overdues), and improve user experience (reminders). They depend on high-priority features and are slated for the second sprint.
- Low Priority (2 Stories): US10, US11
 - Total Effort: 26 story points
 - Details: Administrative tools (reports, performance monitoring) add analytical and maintenance value but are not critical for initial deployment. They are planned for later iterations.

3.2 Development Strategy

The development will follow an Agile approach:

- Sprint 1 (MVP): Implement US1–US5 to deliver a functional system with user access and basic library operations. Target completion within 2 weeks, assuming a team velocity of 20–30 story points.
- Sprint 2: Add US6–US9 and US12 to enhance inventory management, overdue handling, and user notifications. Estimated 2–3 weeks based on effort and dependencies.
- Later Sprints: Incorporate US10 and US11 for administrative refinement, scheduled after core stability is confirmed, likely 3–4 weeks due to higher complexity.

This strategy ensures rapid delivery of value while progressively building system capabilities.

3.3 Risk Mitigation

- Dependencies: Early testing of university database and SMTP integrations to address risks in US1, US2, US4, US9, and US12.
- Performance: Load testing during US3 and US11 development to ensure 500-user capacity and 99.5% uptime.
- Security: Regular audits during US2 implementation to prevent vulnerabilities.

4 Sprint Backlog

4.1 Sprint 1 Backlog

This subsection defines the user stories to be implemented in Sprint 1, targeting the Minimum Viable Product (MVP) as outlined in the Development Strategy (Section 3.2). The selected stories are high-priority features critical for basic system functionality and user interaction.

- US1: User Registration (5 story points)
 - Reference: PPB Section 2.2, Item 1; SRS Section 3.2, Item 1
 - Details: Enables students to create accounts, foundational for system access.
- US2: User Authentication (5 story points)
 - Reference: PPB Section 2.2, Item 2; SRS Section 3.2, Item 2
 - Details: Provides secure login for all users, essential for role-based access.
- US3: Book Search (8 story points)
 - Reference: PPB Section 2.2, Item 3; SRS Section 3.2, Item 3
 - Details: Allows students to find books, a core usability feature.
- US4: Book Borrowing (5 story points)
 - Reference: PPB Section 2.2, Item 4; SRS Section 3.2, Item 4
 - Details: Enables borrowing, a fundamental library function.
- US5: Book Returning (3 story points)
 - Reference: PPB Section 2.2, Item 5; SRS Section 3.2, Item 5
 - Details: Completes the borrowing cycle, critical for operational flow.
- Total Effort: 26 story points
- Duration: 2 weeks (assuming team velocity of 20–30 story points)
- Rationale: These stories establish the MVP, meeting student needs for access and basic library operations, as per SRS Section 2.2 and PPB Section 3.1.

4.2 Sprint 2 Backlog

This subsection identifies a subset of user stories for Sprint 2, selected from medium-priority features to enhance the system post-MVP. The cumulative effort is approximately 1/4 of the full backlog (76 story points total, target 19). Three sprints are planned, with Sprint 1 covering high-priority stories and Sprint 3 addressing remaining features.

- US6: Add Book (5 story points)
 - Reference: PPB Section 2.2, Item 6; SRS Section 3.2, Item 6

- Details: Allows librarians to expand the inventory, building on MVP functionality.
- US7: Update Book (3 story points)
 - Reference: PPB Section 2.2, Item 7; SRS Section 3.2, Item 6
 - Details: Ensures catalog accuracy, supporting inventory management.
- US8: Remove Book (3 story points)
 - Reference: PPB Section 2.2, Item 8; SRS Section 3.2, Item 6
 - Details: Removes outdated books, completing basic inventory management.
- US12: Due Date Reminders (5 story points)
 - Reference: PPB Section 2.2, Item 12; SRS Section 3.2 (Additional Requirement)
 - Details: Enhances user experience by reducing overdue, dependent on borrowing.
- Total Effort: 16 story points
- Duration: 2 weeks (within team velocity of 20–30 story points)
- Rationale: This subset (16/76 = 21% of total effort) approximates 1/4 of the backlog, focusing on inventory management and user experience enhancements. These stories build on Sprint 1's foundation, aligning with SRS Section 2.2 and PPB Section 3.1 goals for librarian and student functionality.