Group 15

## Library Management System Process Analysis Report (LMS-ERP)

Executive Summary

This report details four core business processes Member Registration, Inventory Acquisition, Book Lending (Search/Issue), and Book Return of a modern Library Management System (LMS). These processes are analyzed as fundamental modules within an Enterprise Resource Planning (ERP) context, highlighting system interactions, data dependencies, and cross-functional requirements across the Librarian, Patron, Library Management System, and Database roles.

1. Patron Management (Member Registration Process)

This module governs the onboarding and lifecycle management of all library users (patrons). It is critical for establishing identity, managing access rights, and ensuring compliance with membership policies. The process utilizes an **Exclusive Gateway** for validation and a **Parallel Gateway** for dual classification.

Process Name	Diagram Source
Member Registration	https://tinyurl.com/ye23zd6m
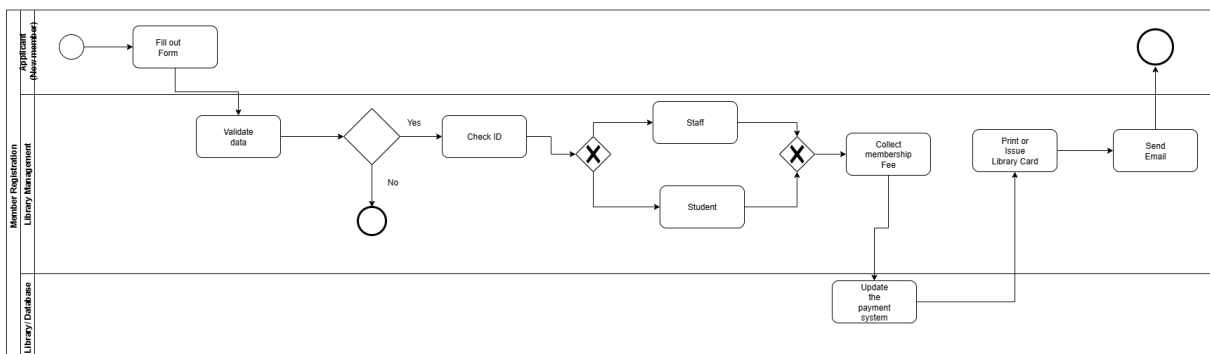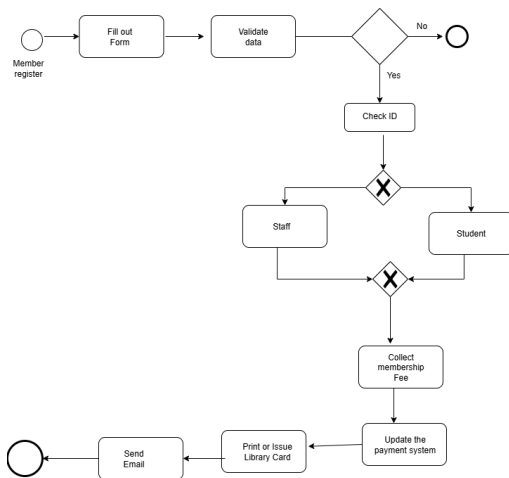
Detailed Module Description

The Patron Management module ensures master data integrity for all users. It is designed to be highly automated, reducing manual input errors and speeding up membership activation. This module functions as the compliance and user relationship command center of the LMS. It's responsible for establishing a patron's complete identity profile, determining their classification (Staff/Student), and verifying financial eligibility. Crucially, it acts as the gatekeeper, governing access permissions for all downstream Circulation activities.

Key Process Flow and ERP Functions:

1. **Initiation and Data Capture (Patron Role):** The process begins when the Patron Fills out Form. This raw data is immediately passed to the system for initial processing.
2. **Data Validation and Blocking (System Role):** The Library Management system executes Validate data. This is an immediate, automatic check (using an Exclusive Gateway) to ensure all mandatory fields (e.g., address, contact, institution ID) are present and conform to defined business rules. If validation fails ('No'), the process is terminated to uphold master data quality.
3. **Classification and Verification (System Role):** Upon successful validation, the system performs a Check ID. This leads to a Parallel Gateway, where the member is simultaneously classified as Staff *and/or* Student based on the ID criteria. This classification is vital for applying differentiated lending rules.
4. **Financial and Status Update:**
   - The Librarian handles Collect Membership Fee.
   - The Library Database is immediately updated via Update the payment system. This step creates an auditable financial transaction record, linking the Patron Management to a notional Financial Management ERP module.
   - The system then executes Print or Issue Library Card, providing the physical access token required for transactions.
5. **Conclusion:** The process ends with the system activity Send Email, confirming the member's activated status and communicating system-generated credentials or policies.

Data Interactions: This process primarily interacts with the Patron master data table, recording personal information, classification type, and membership status (Active/Inactive), which are crucial inputs for the Circulation Management module.

2.Catalog and Inventory Management (Add New Book Process)

This module manages the acquisition and registration of all physical and digital resources. Its function is to create a unique, non-duplicative record for every item, ensuring accurate resource availability tracking.

Process Name	Diagram Source
Add New Book	https://tinyurl.com/5e2hrfmd
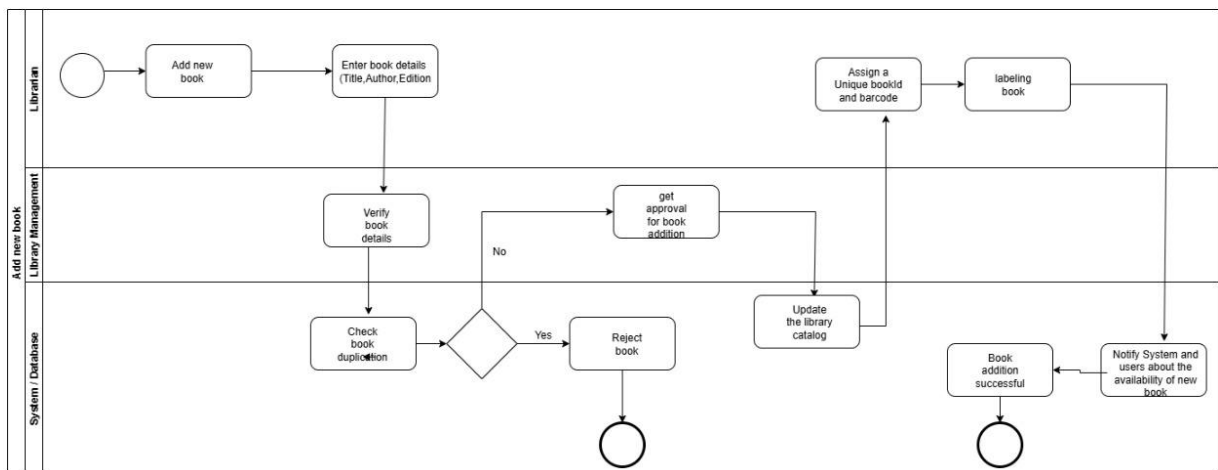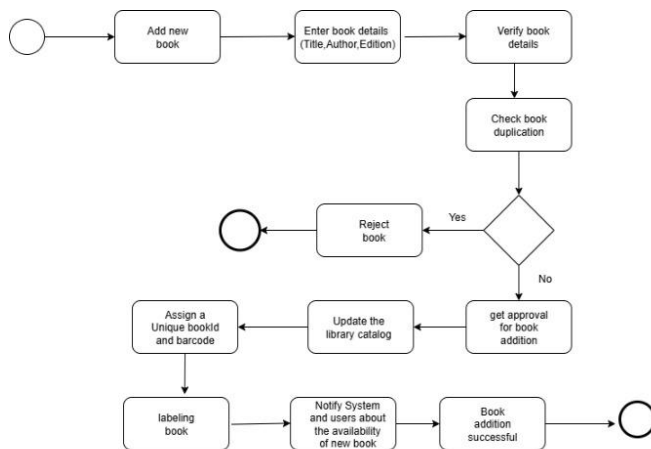
Detailed Module Description

The Catalog and Inventory Management module is the backbone of the entire LMS. It ensures that the inventory is searchable and physically traceable. This process utilizes sequential tasks for data entry, verification, and physical preparation. The Catalog and Inventory Management module is the strategic backbone of the entire LMS, serving as the definitive Single Source of Truth for all resource master data. Its core mission is quality control: meticulously preventing duplication through systemic checks and ensuring every physical asset is accurately indexed and linked via unique identifiers (Barcode, BookID). This robust foundation is what ultimately activates the resource for patron access and circulation.

Key Process Flow and ERP Functions:

1. **Initiation and Data Entry (Librarian Role):** The Librarian initiates the process by manually entering core metadata (Title, Author, Edition) into the system interface.
2. **Verification and Duplication Check (System/Database Role):**
   ○ The Library Management system executes Verify book details (e.g., checking data completeness against recognized cataloging schemas).
   ○ The System/Database then performs the vital Check book duplication using the Exclusive Gateway. If a match exists ('Yes'), the process is terminated via Reject book, mitigating inventory redundancy and preserving data cleanliness.
3. **Authorization and Master Data Creation:** If no duplicate is found ('No'), the system requires get approval for book addition. This step often represents a workflow approval by an acquisitions manager before final commitment.
4. **Database Update:** Upon approval, the system executes Update the library catalog. This action formally creates the unique item record in the Inventory master data table, assigned an initial status of 'Processing'.
5. **Physical and Systemic Fulfillment:**
   ○ The Librarian performs Assign a Unique BookID and barcode and labeling book. These physical steps systematically link the tangible item to its digital record.
   ○ The system then marks Book addition successful and proceeds to Notify System and users about the availability of new book, changing the item's status from 'Processing' to 'Available' for loan.

Data Interactions: This process updates the Inventory master data, generating unique identifiers (BookID, Barcode) and setting the initial Status attribute, which drives the lending process.

3.Circulation Management - Lending (Search and Issue Book Process)

This is the primary operational module dealing with the lending transaction. It integrates real-time inventory status with patron eligibility checks to control the flow of resources.

Process Name	Diagram Source
Search Book	https://tinyurl.com/4k27j24a
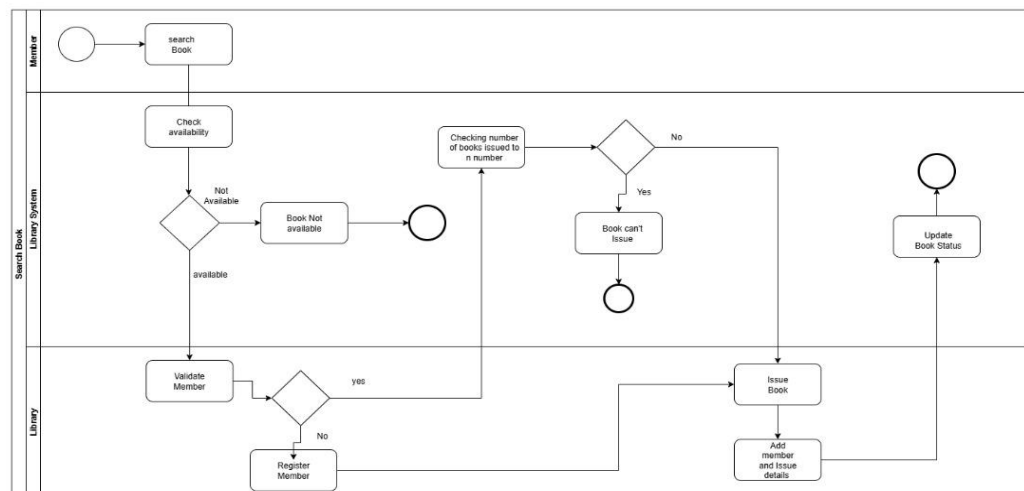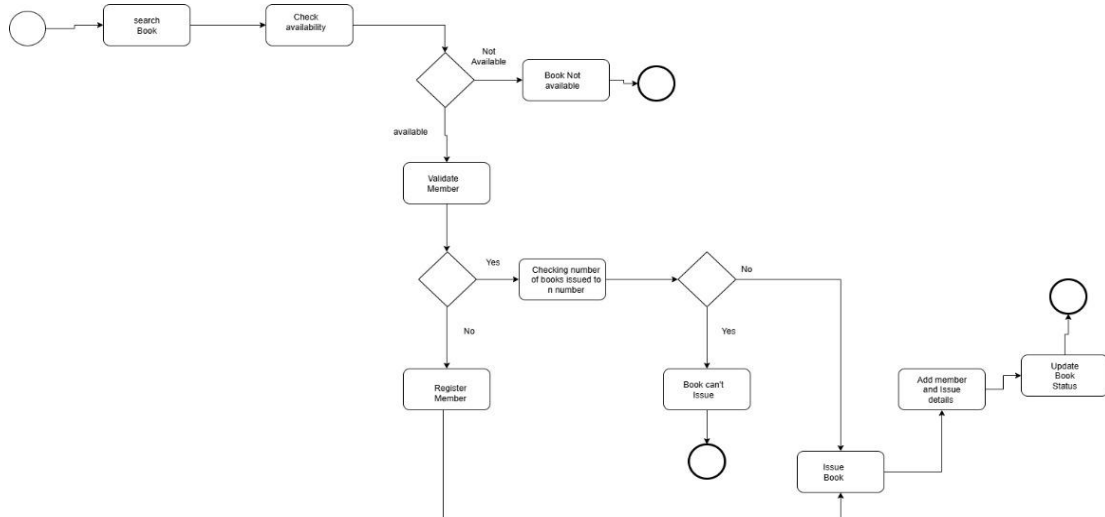
Detailed Module Description

The Circulation Management Lending module is a high volume transaction system designed for rapid decision making at the point of issue. It integrates access control (Patron Management) and resource tracking (Inventory Management). Positioned as the LMS's core transactional engine, this module facilitates resource access through instant, rules based decision making. It executes dynamic, real-time lookups across the Patron and Inventory master files to rigorously enforce lending policies such as eligibility status and item quantity limits. Every successful issue transaction instantly recalibrates resource availability across the system.

Key Process Flow and ERP Functions:

1. **Search and Availability (Patron/System Role):** The Patron initiates the Search Book request. The Library System responds by executing Check availability against the Inventory master data. If the book is Not Available, the transaction is immediately blocked and the process terminates.
2. **Patron Eligibility Check (System Role):** If available, the system must Validate Member against the Patron Management records.
   - If validation fails ('No'), the system offers a necessary recovery path via Register Member (referencing Section 1).
   - If validation succeeds ('Yes'), the process proceeds to policy enforcement.
3. **Policy Enforcement (System Role):** The system performs a hard stop check: Checking number of books issued to a member. This check cross references the patron's current loan records against their allowed limit.
   - If the limit is reached ('Yes'), the transaction is blocked via Book can't Issue.
   - If the limit is clear ('No'), the loan is approved.
4. **Transaction Execution and Updates:**
   - The Librarian executes the physical Issue Book action.
   - The Library Database is immediately updated with two concurrent activities: Add member and issue details (creating a new, active loan record) and Update Book status (changing the book's status to 'Issued' or 'On Loan').
   - **Data Interactions:** This module creates new records in the Loan Transaction table and updates the Status field in the Inventory table, directly impacting future search results.

4. Circulation Management - Returns (Return Book Process)

This module is responsible for concluding the loan transaction, verifying the item's condition, calculating financial penalties (fines), and restoring the item to the available inventory.

Process Name	Diagram Source
Return Book	https://tinyurl.com/463bpn8j
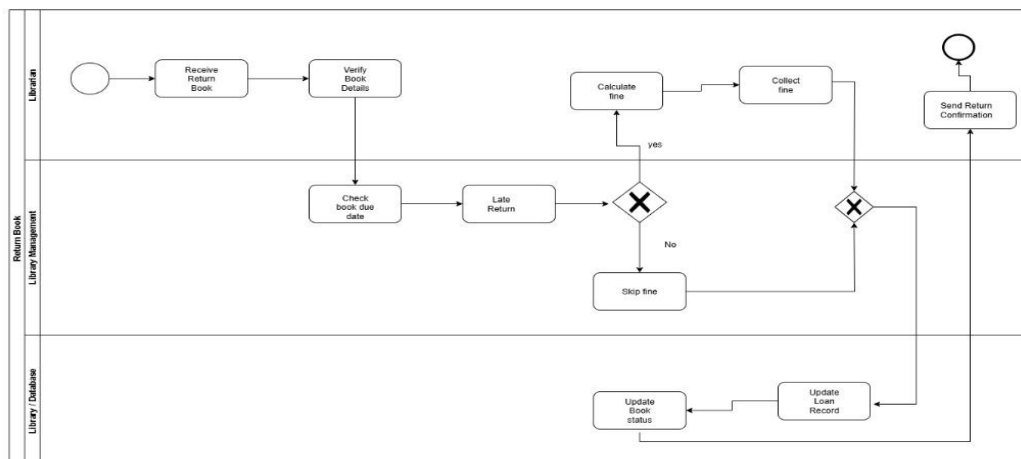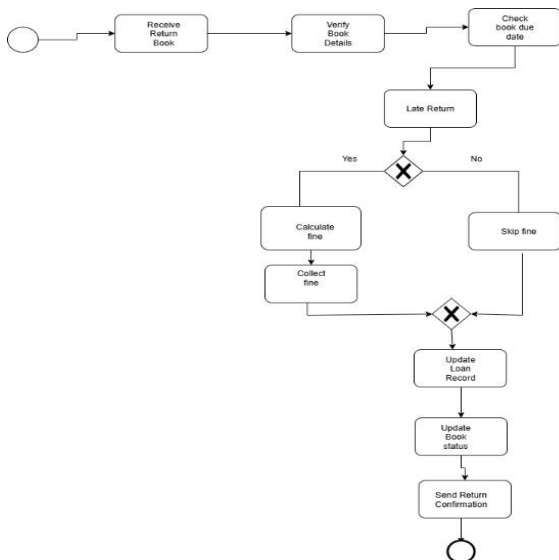
Detailed Module Description

The Circulation Management Returns process is central to effective inventory turn and management, having direct relation with any accounts receivable or financial reporting of the overall ERP system. It involves sophisticated policy management in the form of use of an Exclusive Gateway in the consideration of late returns. It concludes the resource life cycle, thus allowing for effective inventory turn. Acting as the key point for the financial reconciliation, it automatically calculates and assesses penalties for late returns with direct relation to potential financial subsystems. It is critical for its swift process, since the immediate status change for the book from the perspective of availability for use by another patron gives it great value.

Key Process Flow and ERP Functions:

1. **Receipt and Verification (Librarian Role):** The Librarian executes Receive Return Book and verifies the item's details against the open loan record via Verify Book Details.
2. **Policy Decision (System Role):** The Library Management system runs the key decision-point: Check book due date. This uses an Exclusive Gateway to determine if the return is a Late Return ('Yes' or 'No').
3. **Financial Processing (System/Librarian Interaction):**
   ○ If Late Return ('Yes'), the system executes Calculate fine (the major part of the Financial Sub module), that the Librarian should afterwards Collect fine.
   ○ If 'No', the system executes a compulsory Skip fine step (providing clear audit trails).
4. **System Reconciliation:** After fine assessment (or lack thereof), the system executes two concurrent, critical database updates:
   ○ Update Loan Record (formally closing the loan transaction).
   ○ Update Book Status (immediately changing the book's status back to 'Available' for immediate use).
5. **Conclusion:** The process ensures the patron is formally notified via Send Return Confirmation, completing the transaction loop.

Data Interactions: This process closes a record in the Loan Transaction table, updates the Status field in the Inventory table, and may create a new record in a separate Fine/Fee Collection table.

Conclusion and Integration

These four processes cover the entire cycle of operation in an LMS, from intake of original resources (Add New Book) and registration of users (Member Registration) to the main circulation loop (Search/Issue and Return Book) and back again. In ERP, it is the improper data flow from these modules that is paramount:

- Patron Management supplies Circulation Management with authorized user identifications.
- Catalog/Inventory Management provides available, unique item IDs to Circulation Management.
- Circulation Management updates the current status in Catalog/Inventory and creates cost data for a potential Finance/Accounts Receivable module (fines/fees).

This all inclusive methodology ensures that all inventory, patron status, and transactions have one universal point of reference, namely, the prime characteristic of an effective ERP system.

Google Drive:-

https://drive.google.com/drive/folders/1yZHC3aqAy6Nh8iCE-iT7sI1uguzPbbPc?usp=sharing

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