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SRS DOCUMENT

For Library Management System

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SRS Document for Library Management System (LMS)

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1. Introduction

Our system is designed to manage the book records and maintain the records of patrons of the library. It tracks the record of the no of books in the library, how many books issued, have they return or not, have they renewed or not and late books returned fine charges. The software solution is designed based on the system requirements, stakeholder (include librarians, students, faculty, developers, administrator) and the content of operation and the activity to be performed. Its documents include user requirements documents, system design document, test cases, user manuals, support documents. In short, it's all about organizing and managing the library, and library oriented tasks.

1.1 Purpose:

The purpose of a Library Management System (LMS) is to serves to organize library resources efficiently by categorizing books and managing borrower information. By automating tasks such as check-in, check-out, and overdue notifications, it saves time for both librarians and patrons. Generating reports on book availability and borrower history aids in informed decision-making, while user-friendly interfaces enhance the overall experience. Offering online access further increases accessibility, making it convenient for users to search and reserve books remotely. Ultimately, an LMS aims to modernize library operations, improving efficiency and accessibility for all stakeholders. The documentation for a library management system is intended for a diverse group of readers such as developers need technical details, like how the system works and how to install it. Project Managers need a big-picture view, including project plans and progress updates. Marketing Staff need information about the system's benefits and features to attract users. Users (librarians and patrons) need simple guides, FAQs, and help tips to use the system. Testers need plans and tools to check if the system works correctly. Documentation Writers need guidelines and tools to write and update the documents.

1.2 Document Convention:

The title is Library Management System (LMS). For table of contents, a comprehensive list of all the sections and subsections within the document. For Section Numbering, each section and subsection of the document should be numbered hierarchically to indicate its position within the overall structure of the document. For example, for heading, 1. For subheading, 1.1, 1.2, 1.3.1.4, etc. For Font and Formatting, Time New Roman font is used with a size of 12 for text details and sub headings and 14 for headings. Headings and subheadings are bold.

1.3 Project Scope:

The project scope was thoroughly defined in the previous document "Vision and Scope "that's already provided. Please refer to that document for a comprehensive overview.

1.4 References:

I have taken information from the book “Software Requirements “, the third edition which is written by Karl Wiegers and Joy Beatty. The book is present online. Below is the link.
https://www.oreilly.com/library/view/software-requirements-3rd/9780735679658/

2. Overall Description

2.1 Product perspective:

The product perspective for a Library Management System (LMS) involves viewing the software as a comprehensive solution that encompasses various components and interactions within the library environment. From an architectural standpoint, the LMS comprises modules for catalog management, user authentication, borrowing and returning processes, search and discovery functionalities, and reporting capabilities. Additionally, it interfaces with external systems such as library databases, online catalogs, and possibly educational institutions' systems for student information.

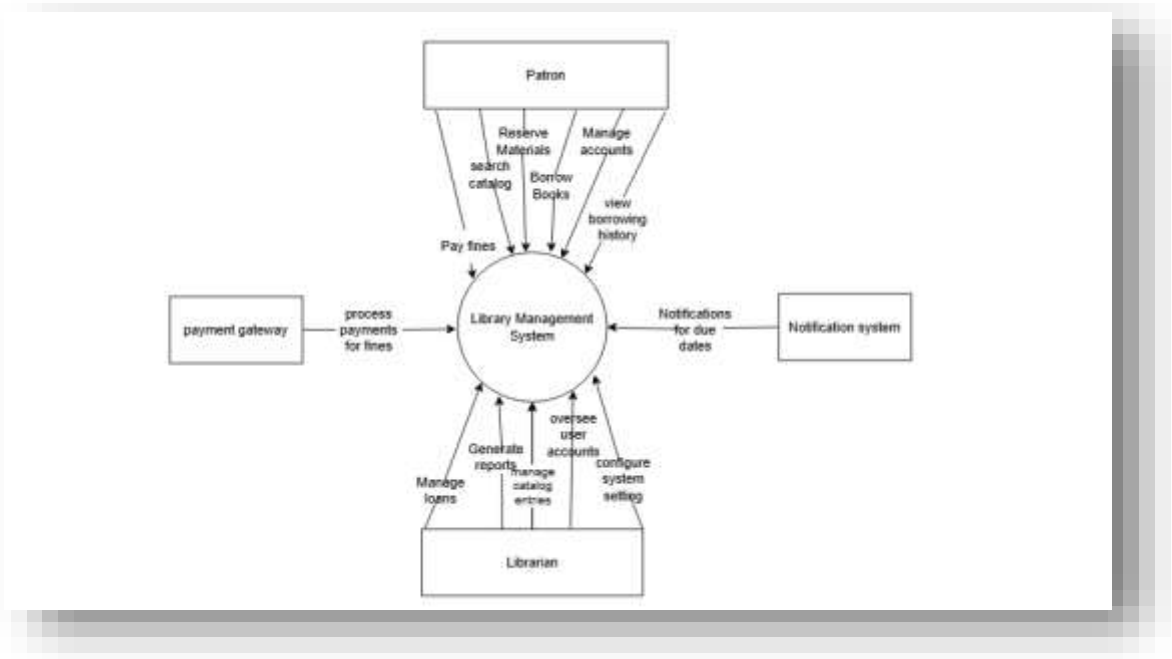

Figure 1.1 Product perspective diagram for LMS

2.2 User Classes and Characteristics:

Name	Number	Description
Patrons	Can be one or more.	Patron can borrow books, search the catalog, and reserve materials. They manage their accounts, updating information, viewing borrowing history, and paying fines for overdue items. These features empower patrons to efficiently access and interact with library resources while ensuring accountability for their transactions.

Librarian	It can be more than one.	A librarian can manage catalog entries, oversee user accounts, facilitate borrowing processes, generate reports, loan management ,configure system settings, and provide technical support.

2.3 Operating Environment:

The operating environment for a Library Management System (LMS) encompasses hardware, software, and infrastructure components necessary for its operation. This includes servers to host the LMS software and database, workstations for library staff to access the system, and network devices for communication. Software requirements consist of an operating system, database management system (DBMS), web server, and compatibility with popular web browsers. Infrastructure considerations include network connectivity, security measures, backup procedures, and scalability. By addressing these factors, the LMS can operate effectively within its environment, facilitating library operations and serving patrons efficiently.

2.4 Design and Implementation Constraints:

CO-1: The organization may have a standard programming language for development projects, such as Java or C#, which must be used for the LMS.
CO-2: The LMS must be compatible with the university's existing technology stack, including database systems, web servers, and authentication mechanisms.
CO-3: All HTML code must conform to the HTML 5.0 standard.

2.5 Assumptions and Dependencies:

AS-1: The library is open during standard university hours on all days when the university is operational, ensuring patrons have access to physical resources and library staff support.
DE-1: The operation of the Library Management System (LMS) depends on integration with the University's Student Information System (SIS) to validate student and staff identities and manage borrowing privileges.
DE-2: The operation of the LMS depends on integration with the Library Inventory System to update the availability status of books and other materials in real-time as items are borrowed, returned, or reserved.

3. System Features

3.1 Borrow Books:

FR-1: The patron shall be able to borrow a book within 5 seconds of scanning the book's bar code while logged into their user account on the LMS.
FR-2: The patron shall be able to view a list of currently borrowed books within 2-4 second of accessing the borrowing history section while logged into their user profile on the LMS.
FR-3: The patron shall be able to receive a notification of the due date within 1 minute of borrowing the book while using the LMS
FR-4: The patron shall be able to renew a borrowed book within 2 seconds of clicking the renew button while viewing their borrowing history on the LMS.

FR-5: The patron shall be able to check if a book is available for borrowing within 1 second of searching for the book in the LMS catalog while browsing the library's collection.

3.2 Catalog Books:

FR-1: The library staff shall be able to add a new book to the catalog within 3 minutes of entering all required book details while using the LMS admin interface.
FR-2: The library staff shall be able to update existing book information within 2 minutes of submitting the changes while editing book details in the LMS.
FR-3: The library staff shall be able to delete a book from the catalog within 1 minute of confirming the deletion while using the LMS.
FR-4: The library staff shall be able to import book data from external sources within 5 minutes of uploading the data file while using the L MS's data import feature.
FR-5: The system shall generate a unique bar code for each new book added to the catalog within 1 second of saving the book details while adding a new book to the LMS.

4. Data Requirements

Information systems work by modifying data to create value. This section explains several parts of the data that will be created as outputs, processed in some way, or consumed as inputs by the Library Management System (LMS).

4.1 Logical Data Model

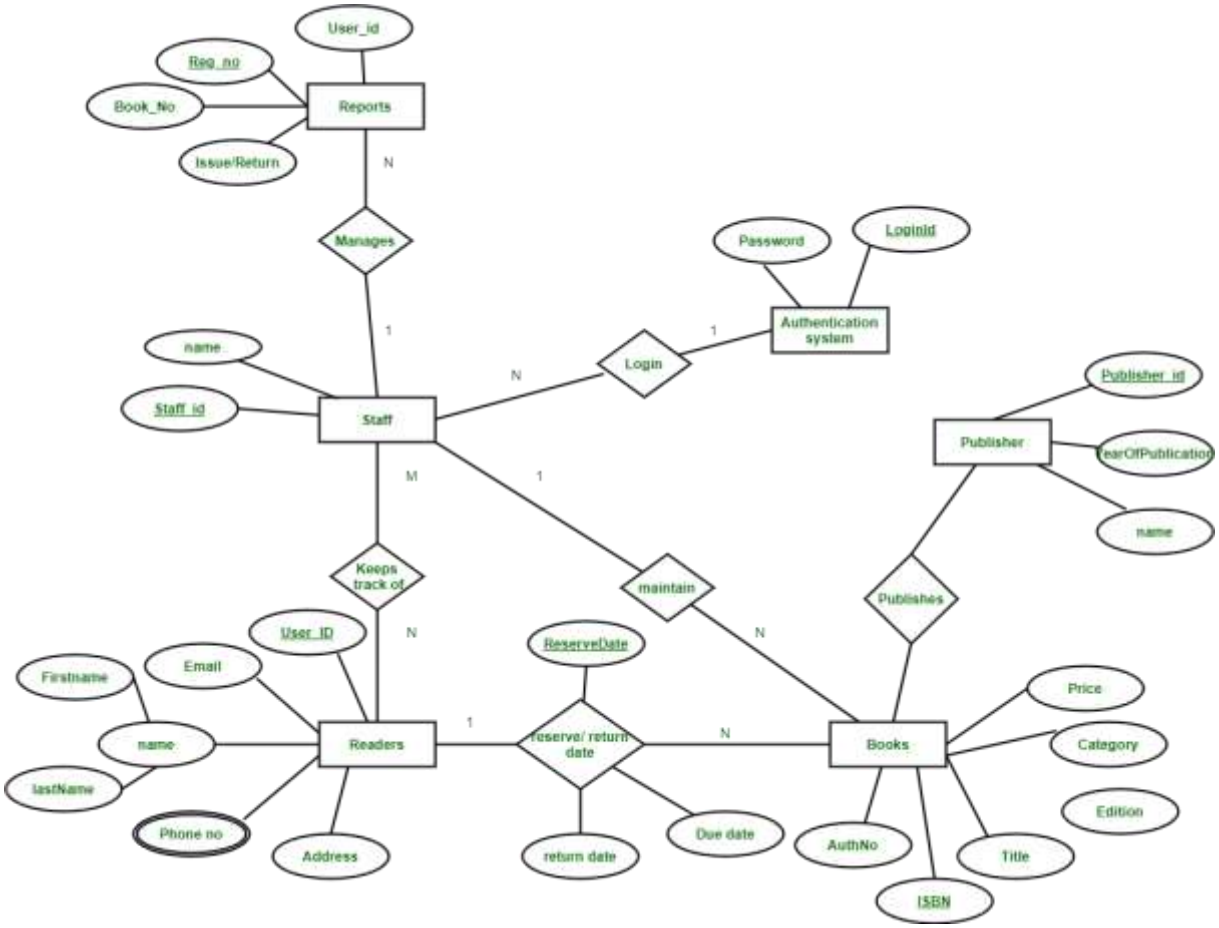

Figure 1.2 Data Model for LMS

4.2 Data Dictionaries:

The data dictionary defines the composition, data type, length, format, and allowed values for data elements used in the LMS, to guarantee consistency and integrity throughout the system. The data dictionary is arranged alphabetically for the convenience of use.

Data Element	Description	Data Type	Length	Allowed Values
Availability Status	Indicates if the book is available for borrowing	Boolean	-	TRUE, FALSE
Author	Author(s) of the book	String	255	Alphabetic characters, can contain spaces
Book Id	Unique identifier for each book	Integer	10	System-generated sequential integer
Borrow Date	Date when the book was borrowed	Date	-	Date in YYYY-MM-DD format
Due Date	Date when the book is due for return	Date	-	Date in YYYY-MM-DD format
Email	Email address of the patron	String	255	Valid email format (e.g., user@example.com)
Fine Amount	Fine amount for late returns	Decimal	-	Positive decimal values
Genre	Genre or category of the book	String	100	Alphabetic characters, can contain spaces
ISBN	International Standard Book Number	String	13	Numeric, 13 digits
Name	Name of the patron	String	255	Alphabetic characters, can contain spaces
Patron ID	Unique identifier for each patron	Integer	10	System-generated sequential integer
Phone Number	Contact number of the patron	String	15	Numeric, can contain dashes
Publication Year	Year the book was published	Integer	4	Four-digit year (e.g., 2023)
Return Date	Date when the book was returned Date	Date	-	Date in YYYY-MM-DD format
Title	Title of book	String	255	Alphabetic characters, can contain spaces
Transaction ID	Unique identifier for each transaction	Integer	10	System-generated sequential integer

4.3 Reports

4.3.1 Borrowed Books Report:

Field	Description
Report ID	LMS-RPT-1
Report Title	Borrowed Books Report
Report Purpose	Librarians want to see a list of all books currently borrowed by patrons to manage inventory and identify overdue books.
Priority	High
Report Users	Librarians
Data Sources	Database of borrowing transactions
Frequency and Disposition	Report is generated on demand by a librarian. Data in the report is static. Report is displayed on the librarian's computer screen and can be printed.
Latency	Complete report must be displayed within 5 seconds after it is requested.
Visual Layout	Portrait mode
Header and Footer	Report header shall contain the report title and generation date. If printed, report footer shall show the page number.
Report Body Fields shown and column headings:	- Patron ID - Book ID - Title - Author - Borrow Date - Due Date - Fine Amount (if overdue)
Selection Criteria	All currently borrowed books
Sort Criteria	Patron ID in ascending order
End-of-Report Indicator	None
Interactivity	Librarians can click on a Patron ID to view patron details.
Security Access Restrictions	Only authorized librarians can access this report.

4.3.2 Overdue Books Report:

Field	Description
Report ID	LMS-RPT-2
Report Title	Overdue Books Report
Report Purpose	Librarians want to identify books that are overdue to manage fines and inventory.
Priority	High
Report Users	Librarians
Data Sources	Database of borrowing transactions
Frequency and Disposition	Report is generated on demand by a librarian. Data in the report is static. Report is displayed on the librarian's computer screen and can be printed.

Latency	Complete report must be displayed within 5 seconds after it is requested.
Visual Layout	Portrait mode
Header and Footer	Report header shall contain the report title and generation date. If printed, report footer shall show the page number.
Report Body Fields shown and column headings:	- Patron ID - Book ID - Title - Author - Borrow Date - Due Date - Days Overdue - Fine Amount
Selection Criteria	Books that are overdue
Sort Criteria	Days overdue in descending order
End-of-Report Indicator	None
Interactivity	Librarians can click on a Patron ID to view patron details.
Security Access Restrictions	Only authorized librarians can access this report.

4.4 Data Integrity, Retention, Disposal:

DI-1: Records of patron interactions with the LMS must be kept for at least three years after the patron's last interaction with the system. Name, contact information, borrowing history, and any fines paid are all included in this. Patron records must be safely removed from the system at the end of the retention period in order to preserve privacy and adhere to data protection laws.
DI-2: Books and other resources must have proper metadata, such as title, author, ISBN, and availability status, kept in their catalog entries. In order to guarantee data consistency and integrity throughout the system, any updates or adjustments to catalog entries must be logged and audit-able.

5. External Interface Requirements

5.1 User Interface:

UI-1: The LMS web pages must be made such that they may be fully navigated and interacted with using just the keyboard, as well as mouse and keyboard combos. With the help of this accessibility function, users who prefer keyboard navigation or who have disabilities can use the system without any limitations.
UI-2: The LMS's search interface will have an advanced search function that lets users look up books by title, author, ISBN, category, or keyword. Clear and well-organized presentation of search results is required, along with the ability to filter and sort results according to availability, relevancy, and other factors.

5.2 Software Interfaces:

SI-1: To ensure synchronization of book records and availability status, the LMS shall transfer catalog updates (additions, alterations, and removals) to the Library Catalog System via a programmatic interface.

SI-2: To provide safe access to user accounts and library services, the LMS will use a programmatic interface to interact with the User Authentication System and authenticate patrons signing in.

5.3 Hardware Interfaces:

HI-1: Scanners are used for digitizing books, documents, and other library materials for electronic access and archiving.
Inputs: Scanner data (books, documents etc.).
Data output: In formats such as JPEG, PNG, or PDF.
Resolution of scanner: 5 DPI to 2400 DPI
Color depth: 8-bit, 16-bit, 24-bit.
Timing Issues: Scan speed can vary depending on resolution and color settings typically, higher resolution and color depth increase scan time.
HI-2: Public computers available for patrons to use for internet access, catalog searching, and accessing digital resources.
Inputs: User credentials, search queries, digital resource requests.
Outputs: Search results, digital content (e.g., e Books, PDF, streaming media).
User credentials: Valid library card numbers and PIN.
Timing Issues: Response time should be less than 2 seconds for search results and page navigation.
HI-3: Bar code scanners are used to scan bar codes on books and library cards for quick and accurate data entry during check-in/check-out processes.
Inputs: Bar code data (ISBN, library card numbers).
Outputs: Confirmation beeps on successful scans.
Bar code formats: EAN-13, ISBN, Code 128, Code 39.
Timing Issues: Scanning should be under 1 second per scan.

5.4 Communications Interfaces:

CI-1: The LMS shall send an email or text message (based on user account settings) to the Patron to confirm acceptance of a book reservation, due dates.
CI-2: The LMS shall send an email or text message (based on user account settings) to the Patron to report any issues with a book reservation or borrowing process.

6. Quality Attributes

6.1 Usability Requirements:

UR-1: The LMS shall allow a Patron to retrieve their previous borrowed book history with a single click.
UR-2: 95% of new users shall be able to successfully search for and reserve a book without errors on their first try.

6.2 Performance Requirements:

PR-1: The system shall accommodate a total of 1000 users and a maximum of 250 concurrent users during the peak usage time window of 12:00 P.M. to 4:00 P.M. local time, with an estimated average session duration of 10 minutes.

PR-2: The system shall display confirmation messages to users within an average of 2 seconds and a maximum of 5 seconds after the user submits information to the system.

6.3 Security Requirements:

SR-1: Users shall be required to log on to the LMS for all operations except viewing the library catalog.
SR-2: Only authorized Library Staff shall be permitted to manage book inventories.

6.4 Safety Requirements:

SR-1: The system shall provide training and support resources for users on safe internet practices, including how to protect personal information and recognize phishing threats.
SR-2: The LMS shall include regular backups and recovery plan to prevent data loss.

6.5 Availability Requirements:

AR-1: The Library Management System (LMS) must be operational at least 98% of the time from 8:00 AM to 8:00PM, excluding times set aside for scheduled maintenance.
AR-2: The LMS shall support offline operations for check-in/check-out of books during temporary network outages, with automatic synchronization once the connection is restored.
6.6 Robustness Requirements
RR-1: The LMS shall perform regular data integrity checks and backups to ensure that all data remains accurate, consistent, and recoverable in the event of a system failure.
RR-2: The LMS shall automatically save user work, such as search queries and data entry, at regular intervals to prevent data loss in case of unexpected system failure.

7. Internationalization and Localization Requirements:

IR-1: The LMS shall support multiple languages, allowing users to select their preferred language from a list of supported options during login or in their user profile settings.
IR-2: The LMS shall provide customer support, user manuals, help files, and support documentation in the languages corresponding to the locales it serves.
LR-1: The LMS shall support regional formats for dates, times, numbers, and currency. This includes:
Date: DD/MM/YYYY
Times: 12-hour and 24-hour formats and UTC formats
Currency: Rs. 1,000.00

Appendix A: Analysis Models

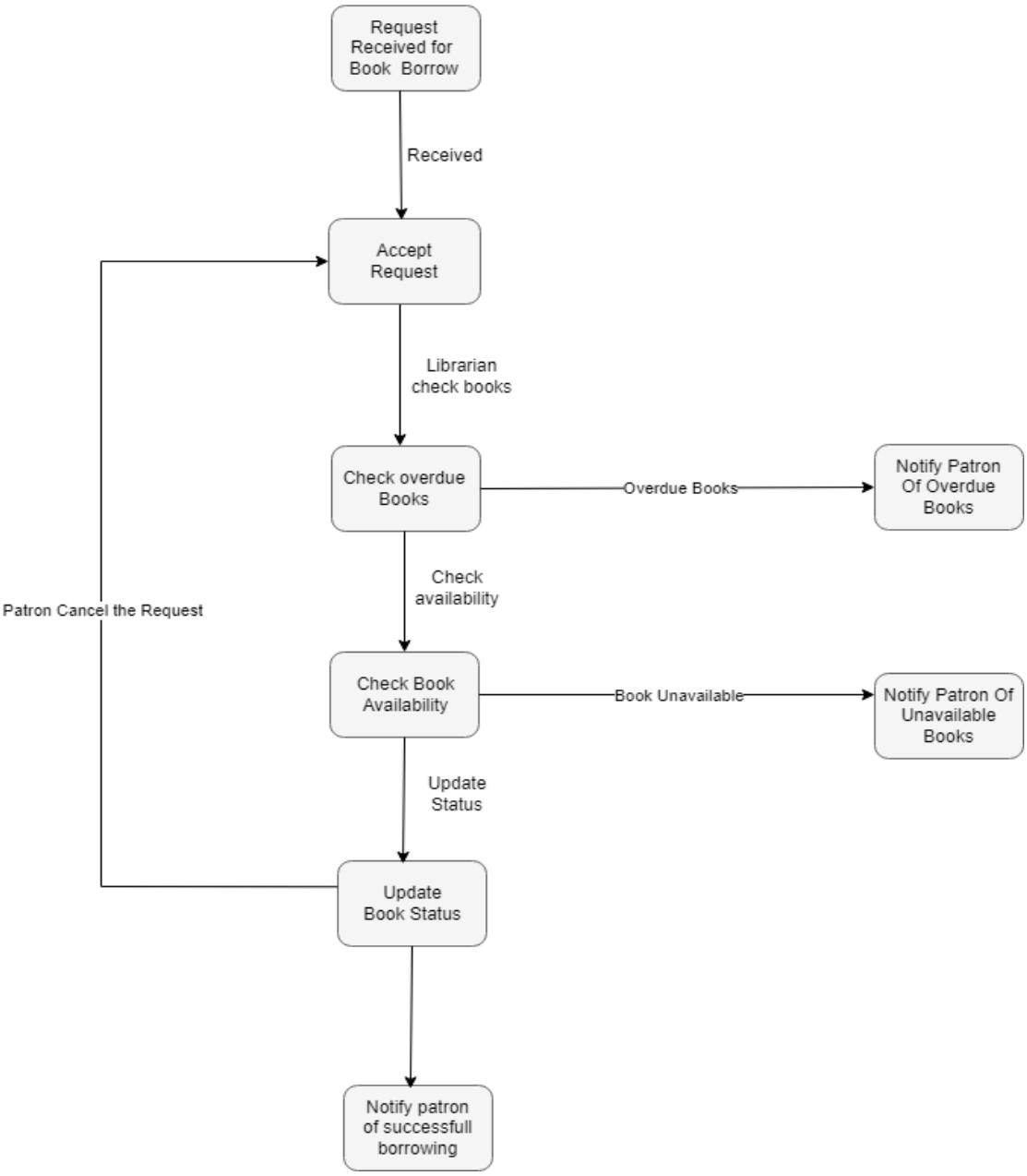

Figure 1.3 State Diagram for LMS

Appendix B: Glossary

Audit-able	The ability of an auditor to get accurate results when they exam an Organization's financial reports.
Catalog	A complete list of items, typically in a systematic order or alphabetically.
C#	A programming language named C#.
External Interface	The interactions between a software system and external entities. These entities can be other software systems, hardware devices, databases, or even human users.
FAQs	Frequently asked questions.
Html	The standard markup language for creating Web pages.
Internalization Requirement	It should follow international requirements like it displays the date convention as "November 14" in the United States, but as "14 November" in England.
Internal Interface	A connection to a device inside the computer's cabinet.
ISBN	It is a 13-digit number that uniquely identifies books and book-like products published internationally.
Integration	The process of combining two or more things to create a whole.
Localization Requirement	It requires that data about citizens or residents of a certain country should be collected, processed, or stored within that country.
LMS	Library Management System.
Network Outages	A disruption causing total or partial inaccessibility to a service or system.
Patron	A user of the system.

Phishing Threats	Use emails, text messages or websites to trick people into sharing sensitive data, downloading malware or otherwise exposing themselves.
Programming interface	A code that enables two software programs to communicate.
Robustness	The quality of being strong, and healthy.
SRS	Software Requirement Specification .
Synchronization	The action of causing a set of data or files to remain identical in more than one location.