SOFTWARE REQUIREMENTS SPECIFICATION

FOR

LIBRARY MANAGEMENT WEBSITE

Version 1.0

Prepared by

Team Gamma

Jesuloluwa Eyitayo, A04904703

Maria Adela Soto Alvarez del Castillo, A04944834

Ravikrishna Yalagala, A04932557

Proposed to

Dr. Joaquin Palacios

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Revision History

Name	**Date**	**Reason For Changes**	**Version**
Initial Version	02/15/2019	Initial version of the document	1.0
Review	02/21/2019	Feedback	1.1

1. Introduction

1.1 Purpose

The main purpose of this document is to provide detailed description for the Library Management Website. This document contains the behavioral, functional and non-functional requirements of the project as well as design methodologies and constraints. It also contains the guidelines needed for Project Managers, Software Designers, Software Developers and System Testers to start working on the project.

1.2 Document Conventions

1.2.1 Acronyms and Abbreviations

Acronyms	**Meaning**
LMW	Library management website
SRS	Software Requirement Specifications
ISBN	International Standard Book Number
PHP	Hypertext Preprocessor
SQL	Structured Query Language
MS SQL Server	Microsoft Structured Query Language

The library materials include Books, Tapes and DVDs.

1.3 Intended Audience and Reading Suggestions

The intended audience for this SRS are the Developers, Project Managers, End Users(College Students, Staff, Faculty etc.), System Designer, System Administrator, and System Testers of the Library Management Website. This SRS contains a user-friendly description of the requirements specification for the intended audience listed above. Suggested changes made to the SRS by the intended audience will be added to the revision history so It can be a reference to the developing team about the latest changes made to the LMW. The Project Managers, Systems Designers and Systems Administrator can begin reading the SRS by reading the Introduction and System Features as well as Interface Requirements.

1.4 Product Scope

LMW system is a library management platform for users to make use of all the necessary services for creating, deleting, updating and searching for Information. The software will reflect all the requirements defined by the customer. The Library Management Website will enable Librarians to perform all necessary procedures online as well as added features like upgrade Users to be Administrators. According to the customer requirements, the software to be developed will consist of database to manage a wide variety of data such as:

- Books, journals, magazines, newspapers, diploma thesis, etc.
- Digital items, that College has (software, music) integrated with Item's database.

The design of product interface to be developed will be supported by Mozilla Firefox, Safari, Microsoft IE, Google Chrome and Opera browsers. The website's User interfaces should be simple and easy-to-use.

1.5 References

- Software Engineering: A practitioner's approach. Roger S. Pressman, Ph.D, 7th ed. 2010.
- IEEE 830-1998 standard for writing SRS document.

2. Overall Description

2.1 Product Perspective

Library Management System is an improvement on the ordinary (physical) library management systems which relies on paper work for recording book and processing users information.

2.2 Product Functions

2.2.1 User

- Library members should have an account created with the system in order to check materials out.
- Library members have to enter the following in order to create an account; First name, Last name, Middle name, Mailing Address, Email Address (Username), Password, and Driver's License, City and State.
- Library members should be provided with the updated information about the books catalog.
- Library members can access their account’s information and modify it except Username (Email Address) and City.
- Library members have the ability to look up the Library Materials by searching through books by partial title, author's name, ISBN number, or the Library of congress call number.
- Library members can extend the period of borrowing books in accordance with the library policy and within 5 days of due date.
- Library member can reorder the list by the due date if available.
- Library member can request a reservation for loaned out Library Materials.
- Library member can cancel a reservation previously initiated.

2.2.2 Administrator

- Admin should be able to add, modify and delete Library Materials in the catalog.
- Admin cannot make deletions for checked-out materials, but only when they are returned.
- Admin can suspend Library members according to the library policy.
- Admin can increase the period for Loaning a book for Library Users.
- Admin can get the information (status report) of any member who has borrowed a book.
- Admin can enter materials which are returned.

2.2.3 System

- Sends late return warnings to people who have exceeded the loan time period.
- Generates a late fee bill charging $0.50 for each day late
- Shows the amount in late fees that is being accrued.
- Checks if the loaned items are being returned after its due date.
- Generates an email to a library member if there is a reservation for the returned item.

2.3 User Classes and Characteristics

There are two classes of users that will be making use of the LMW, the Librarians (administrators) and the Patrons (Library Users). The Librarians are responsible for maintaining the library management website while the Library Patrons are needed to have the elementary knowledge of using the Computer as well as the Internet browser. Administrators of the system should have more knowledge of internal modules of the system and are able to rectify small problems that may arise due to disk crashes, power failures and other catastrophes.

2.4 Operating Environment

The LMW shall operate in all famous browsers, for instance, we are making use of Google Chrome, Microsoft Internet Explorer, Mozilla Firefox with Flash Player and JavaScript.

2.5 Design and Implementation Constraints

- The Online Library System should run 24 hours a day.
- The information of all users and libraries materials must be stored in a database that is accessible by the website.
- MYSQL will be used as SQL engine and database.
- Users may access from any computer that has Internet browsing capabilities and an Internet connection.
- Users must have their correct usernames and passwords to access their online accounts and perform actions.

2.6 User Documentation

A detailed manual is to be delivered with the software to better explain how to use the Library management website and perform the functions in the system.

2.7 Assumptions and Dependencies

The product needs the following third party services.

- MYSQL database is used for storage.
- PHP is used to develop the Library Management Website.
- Apache is used to deploy and host the application for users to use.

3. External Interface Requirements

3.1 User Interfaces

3.1.1 Account Creation

In the case that the user account has not been created yet, the prospective user can enter the details and create an account. Which asks the user to type his first name, last name, middle name, mailing address, email address (as the user name), password, and driver's license, city and state. The driver's license and state are used to verify that the given last name and mailing address are valid.

3.1.2 Login

The user is assumed to have an account created already, this interface asks for the username and password. In the event that the user entered either the username or password incorrectly then an error message displays.

3.1.3 Search

The users can enter the library material's partial title, author's name, ISBN number, or the Library of Congress Call Number he/she is interested in viewing or checking out.

3.1.4 Admin Control Panel

This control panel contain actions that the admin can perform on the application. These actions include to add, confirm, or remove users; to add, edit, or remove a library materials. The action also includes managing loaning options.

3.2 Hardware Interfaces

A computer system with the basic requirements and is internet connected is required. No other specific hardware is required to run the software.

3.3 Software Interfaces

- A browser is required to load and view the web pages of the application.
- An Operating System is required to run the browser.

3.4 Communications Interfaces

This application will require email function to be setup for the website for communication with the library users to remind the users of approaching deadline. Also, HTTP will be used to access the hosted application from the internet.

4. System Features

4.1 Search for Library Materials

4.1.1 Description and Priority

The Library members or admins users can search for Library materials that match the search criteria and that can be sorted by the following

- Partial Title
- Author's Name
- ISBN number
- Library of Congress Call Number

Consequently, all the matching materials are displayed, including the ones that have been checked-out. The due date for the checked-out materials should be displayed as well. The user can reorder the list by the due date, if any. The User can select an available item from the search results and check it out.

This feature is regarded as a high priority feature because it forms the basis for the application and a point of entry for the user to view Library materials.

4.1.2 Stimulus/Response Sequences

User Actions	System Responses
Searches for library materials based on the search criteria.	Matching materials including the checked out materials are displayed.
Selects an item from the search result.	Detailed Information for the Selected material is displayed.

4.1.3 Functional Requirements

REQ-1: The LMW should allows users to search all the library materials.
REQ-2: The LMW should support a large number of users as well as a large number of requests from those users.
REQ-3: The LMW should provide the access of Database containing the library materials.

4.2 Manage Library Materials

This feature allows an admin user to add, delete, and modify library materials in the catalog. Deletions cannot be made for checked-out materials, but only when they are returned. Modifications can include new copies of the same book, CD, etc.

This feature is regarded as a high priority feature because it allows the admin user to make changes to the library materials database.

4.2.1 Stimulus/Response Sequences

Admin Actions	System Responses
When adding a new material, Admin inputs all the details of the library material and submits.	Displays a success message if the inputted library material is not existing in the database and displays a failed message if the inputted material already exist.
When Modifying a material, the user edits fields like the number of copies of the same books, CD and submits.	Displays a success message if successfully modified and failed message if unsuccessfully modified.
When Deleting a material, the user view the library material and hits delete.	Displays a confirmation message for the admin user. If confirmation is successful, the system deletes the material if it has not been checked out already. A success message is displayed if the material has not been checked out.

	If the material has been checked out, a message stating “the material has to be returned to check out” is displayed.

4.2.2 Functional Requirements

REQ-4: The LMW should store information about new library materials in the database.
REQ-5: The LMW should allow admin users to delete and modify library materials in the database, and check availability of these items.

4.3 Create a User Account

This feature allows a user to create an account with the system in order to check the library materials out. The user creates an account by entering first name, last name, middle name, mailing address, email address (as the user name), password, and driver's license and state. The driver's license and state is used to verify that the given last name and mailing address are valid. The system also allows the creation of admin user accounts: For this type of account, the entry screen will request a permission code which is validated with the one stored in the system.

This feature is regarded as a high priority feature because it allows the potential users to have an account on the LMW.

4.3.1 Stimulus/Response Sequences

User Actions	System Responses
The user enters the following ● First name ● Last name ● Middle name ● Mailing address ● Email address ● Password ● Drivers ● State ● City	Displays a success message if the account was created successfully and displays a failed message if the account creation was not successful.

And Submits	

4.3.2 Functional Requirements

REQ-6: The LMW should store information about all the users in the database.
REQ-7: The LMW should send the users an email notification about the account creation.
REQ-8: The LMW should use the drivers licence and the state to verify the user.
REQ-9: The LMW should make use of separate databases for the Library materials and the users

4.4 Manage User Account

This feature allows a library members(Patron) to edit their own information except for name ,city and state. A patron user account can be updated to admin type by entering the proper permission code. It can also be suspended by an admin user.

This feature is regarded as a high priority feature because it allows the users to manage their account on the LMW.

4.4.1 Stimulus/Response Sequences

User Actions	System Responses
User views updated information except for name, city and state and clicks Update.	The System displays a success message if the edit was successful or a failed message if the edit was not successful.
Admin Searches for a user.	The System displays a list of all the users on LMW.
Admin Enters the proper permission code.	The System Presents the User with the options of Upgrading account to Admin or Suspending Users Account.
Admin Selects an option after entering the permission code.	The System performs the action based on the users selection. The System return a

	display success message if the action was successful or a failed message if the action was not successful.

REQ-10: The LMW should send the users an email notification about users account modification.
REQ-11: The LMW should save the permission code in the database.

4.5 Checkout Library Materials

This feature allows users to check out library materials. A deadline is set for when the user should return the checked out material.

This feature is regarded as a high priority feature because library materials will always be checked out by library members and it's an important feature to have on the LMW.

4.5.1 Stimulus/Response Sequences

User Actions	System Responses
User searches for a material	The System displays a list of matched library materials.
User checks out available library materials	The System checks that the user has not been late in returning items more than 3 times. If the user has been late in returning materials more than 3 times, the System checks that the maximum number of 2 checked out items for the user has not been exceeded. However, if the user has not been late in returning materials more than 3 times, The System checks that the maximum number of 5 checked out items for the user has not been exceeded. The System produces a loan ticket which can be printed and used to walk the

	material out of the building. The System sends an email to user with the loan ticket and return date. The System return feedback to user in the LMW

4.5.2 Functional Requirements

REQ-12: The LMW should allow materials to be checked-out for up to 21 days at a time.
REQ-13: The LMW should store the checked out materials in the database.
REQ-14: The LMW should send email to the user after checkout with the loan ticket and return date.

4.6 Request a Reservation for Library Materials

This feature allows users to make a reservation for checked out materials library materials.

This feature is regarded as a medium priority feature because library materials. This feature is not as important as the high priority feature but it improves the user experience of the LMW.

4.6.1 Stimulus/Response Sequences

User Actions	System Responses
User makes a request for a library material that have been checked out	The System sends an email to the user of when the item will be returned. The System return feedback to user in the LMW
User checks out available library materials	The System produces a loan ticket which can be printed and used to walk the

	material out of the building.

4.6.2 Functional Requirements

REQ-15: The LMW should store reservation information in the database.
REQ-16: The LMW should send the users an email notification about the return date of the reserved item.

4.7 Renew Checkout Materials and Cancel Reservations

This feature allows a user to log in to renew checked-out materials which are within 5 days of their due date. The exception is if there is a reservation on file for the same material. Also, a reservation can be canceled by the user at any time.

This feature is regarded as a high priority feature. Library materials need to be checked out and there will always be cases where checked out materials need to be renewed or canceled.

4.7.1 Stimulus/Response Sequences

User Actions	System Responses
User views checked out materials	The System displays a list of checked out materials.
User renew checked out materials	The System checks that the user has not renewed the checked out material before for the particular loan ticket. If the user has not renewed the checked out material for that loan ticket before, the System renews and notifies the user. However, If the user has renewed the checked out material for that loan ticket before, the System advices the user to return the material then re-checking out.

4.7.2 Functional Requirements

REQ-17: The LMW should allow the user to renew checked out materials only once the it must be returned.

4.8 Return Checked out Materials

This feature allows an admin user to enter materials which are returned. Upon this action, the system will generate an email to a patron if there is a reservation for the returned item. The system also checks if the item is being returned after its due date; in this case, it will generate a late fee bill charging $0.50 for each day late. It will also record that one more late return has been accrued by this user.

This feature is regarded as a high priority feature. Checked out Library materials need to be returned.

4.8.1 Stimulus/Response Sequences

User Actions	System Responses
Admin returns checked out materials	The System sends an email to a library member who had previously made a reservation for the returned item. The system checks that the item is being returned after its due date. If the due date has passed, a late fee bill charging $0.50 for each day late and a record that one more late return has been accrued by this user.

4.8.2 Functional Requirements

REQ-18: The LMW should sends an email to a library member who had previously made a reservation for the returned item.

4.9 Send Due Date Reminders

This feature sends emails daily beginning when the due date for a material is within 3 days of the current date. Once the material is overdue, the reminder must also show the amount in late fees that is being accrued.

This feature is regarded as a medium priority feature. The user has to be reminded that the deadline of the checked out material is up to 3 days from the current date.

4.9.1 Stimulus/Response Sequences

User Actions	System Responses
The user receives emails daily beginning when the due date for a material is within 3 days of the current date.	The System checks the deadline of the checked out material and if it within 3 days of the current date, daily emails is sent to her.

4.9.2 Functional Requirements

REQ-19: The LMW should send emails daily beginning when the due date for a material is within 3 days of the current date.

4.10 Login

This feature allows the user to login to LMW with the email address (user-name) and password.

This feature is regarded as a high priority feature. This provides access for the user into the LMW system.

4.10.1 Stimulus/Response Sequences

User Actions	System Responses
The user enters username and password and submits	The System validates the user and if validation was successful, the user is allowed access into LMW. However, if validation was not successful, and error message is displayed to the user

4.10.2 Functional Requirements

REQ-20: The LMW should provide access to validated users.

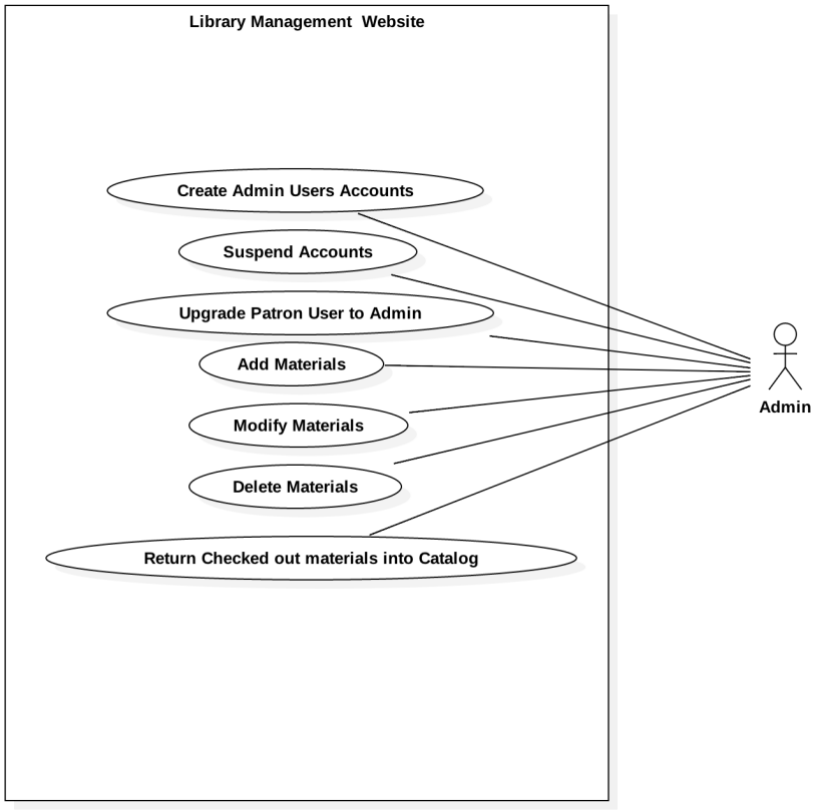

Figure 1: Use Case of the Library Administrator

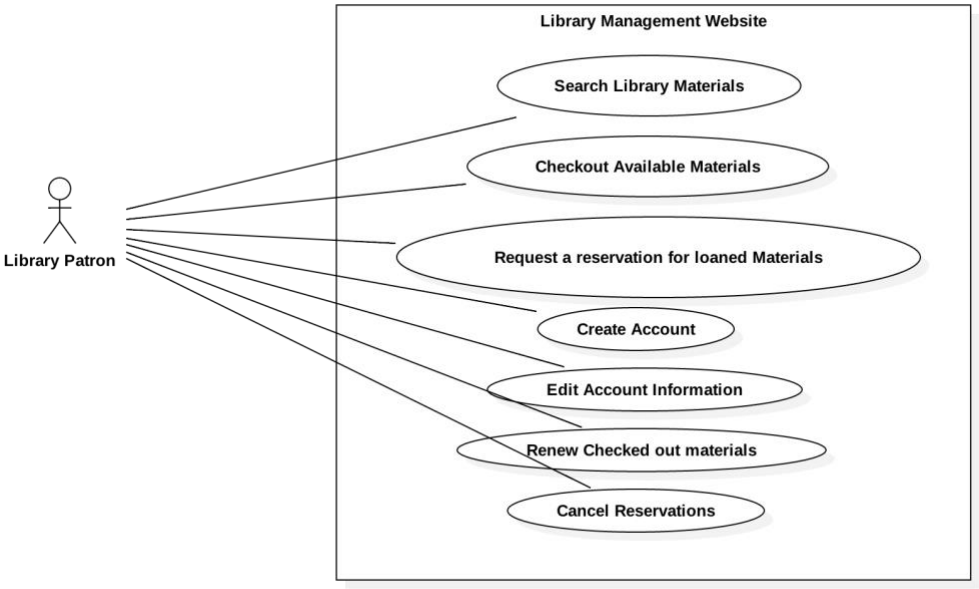

Figure 2: Use Case of the Library Patron

5. Other Nonfunctional Requirements

5.1 Performance Requirements

- The system shall accommodate large number of books and users in the database without any fault.
- The search time for Library materials should be fast when requested by users.
- The LMW should be available for use 24 hours per day, 365 days per year.

5.2 Safety Requirements

- The application should not lose users information. It can back up at intervals so as to avoid data loss.
- The use shall not cause any harm to human users.

5.3 Security Requirements

- System will use secured database
- Normal users can just read information, but they cannot edit or modify anything except their personal and some other information.
- System will have different types of users and every user has access constraints.
- Access to the LMW is permitted only for University student and staff after authorization procedures.

5.4 Software Quality Attributes

Ease of use over easy of learning: The application is designed to feel be user friendly.

5.5 Business Rules

- Every user must be registered on the LMW in order to search for library materials.

- Is not necessary that the user has to write the whole name from the material in order to do a search. If the user enters the material's partial title, authors name, ISBN number, or the Library of Congress Call Number. Then the search most return the results.

- When the results of a search are displayed it should show all the matching materials if there are some materials checked-out then the system should indicate the due date.

- If there is some material checked out, then the user could reorder de results from the searched by due date.

- The user could select any available item for checking it out.

- If a material is checked out, then the system will produce a loan ticket which can be printed out and used to walk the material out from the building.

- If the material is on loan, then the user could request a reservation, which will send him/her an email when the item is returned.

- When the loan is authorized the system should check how many items does the user has in a loan. If the number of items exceeds 5 then the loan would be refused.

- If the user has been late in returning material more than three times, then he/she could only take 2 materials in a loan.

- Materials could be checked-out for up to 21 days at a time.

- An user can have an account, and just one account.

- The user account should contain first name, last name, middle name, mailing address, the email address which should be the user name, password, driver's license, and state.

- The driver's license and state in needed to verify that the given last name and mailing address, both are valid.

- If an admin user account is going to be create then the entry screen will request a permission code which is validated with the one stored in the system. If any user enters the right code, then he/she would be an admin user.

- The system should allow the user to update any data except the user name and city.

- The user should renew checked-out materials which are within 5 days of their due date. If there is a reservation on the material, then he/she shouldn't renew it.

- If the user needs to cancel a reservation, then he/she could do it at any time.

- The admin user should add, delete, and modify materials in the catalog. Any modification includes copies of the same book, CD, etc.

- If a deletion on the material is needed, then they can be deleted when they return, not before.

- When a material returns the admin should enter it to the system, then the system will generate an email to a user if there is a reservation for the returned item.

- If the item is being returned after its due date, then it will generate a late fee bill charging $0.50 for each day late. Also, the system will record the user.

- The system should send emails daily when the due date for a material is within 3 days of the current date. Once the material is overdue, the remainder must also show the amount in late fees that are being accrued.

6. Other Requirements

6.1 Legal Requirements

- Sensitive information must be treated with ethics.
- The LMW should comply with quality assurance University standards.

6.2 Look and Feel Requirements

According to the Customer requirements, the application should include following interfaces:

- The LMW interfaces will the same for patrons and librarians. Differences will depend on users' functions. Patrons will have simple version of LMS without add, remove and modify possibilities.
- Web interface. This interface will provide the functions needed on the application. Web interface should work correctly in different browsers.

6.3 Usability Requirements

- Ergonomic and clear interface.
- The interface should contain prompts and help to avoid making mistakes.
- The product should be used by people with no training.

6.4 Operational Requirements

- The LMW should be used on IBM-compatible workstations with 50 Mbytes free space on HDD for library workstations (80 Gbytes for server) and 32 Mbytes RAM for library workstations (256 Mbytes for server).
- The LMW should be correctly implemented in different Internet browsers.

6.5 Maintainability and Portability Requirements

- Changes (new patrons' addition, password changes, database changes) must be verified once per day at least.
- The LMW is expected to run under MS Windows 10.

Appendix A: Glossary

- **Admin User:** system administrator, or sysadmin, is a person who is responsible for the upkeep, configuration, and reliable operation of computer systems; especially multi-user computers, such as servers. The system administrator seeks to ensure that the uptime, performance, resources, and security of the system they manage meet the needs of the users, without exceeding a set budget when doing so.

- **Adobe Flash Player:** (labeled Shockwave Flash in Internet Explorer and Firefox) is computer software for using content created on the Adobe Flash platform, including viewing multimedia contents, executing rich Internet applications, and streaming audio and video. Flash Player can run from a web browser as a browser plug-in or on supported mobile devices. Flash Player was created by Macromedia and has been developed and distributed by Adobe Systems since Adobe acquired Macromedia in 2005.

- **Gigabyte:** is a multiple of the unit byte for digital information. The prefix giga means 109 in the International System of Units (SI). Therefore, one gigabyte is 1000000000 bytes. The unit symbol for the gigabyte is GB.

- **Google Chrome:** (commonly known simply as Chrome) is a cross-platform web browser developed by Google. It was first released in 2008 for Microsoft Windows and was later ported to Linux, macOS, iOS, and Android. The browser is also the main component of Chrome OS, where it serves as the platform for web apps.

- **Hard Disk Drive (HDD):** hard disk, hard drive, or fixed disk, is an electromechanical data storage device that uses magnetic storage to store and retrieve digital information using one or more rigid rapidly rotating disks (platters) coated with magnetic material. The platters are paired with magnetic heads, usually arranged on a moving actuator arm, which read and write data to the platter surfaces. Data is accessed in a random-access manner, meaning that individual blocks of data can be stored or retrieved in any order and not only sequentially. HDDs are a type of non-volatile storage, retaining stored data even when powered off.

- **IEEE**: The Institute of Electrical and Electronics Engineers (IEEE) is a professional association with its corporate office in New York City and its operations center in Piscataway, New Jersey. It was formed in 1963 from the

amalgamation of the American Institute of Electrical Engineers and the Institute of Radio Engineers.

- **Internet Explorer**: (formerly Microsoft Internet Explorer and Windows Internet Explorer, commonly referred to as Explorer and abbreviated IE or MSIE) is a series of graphical web browsers (or as of 2019, a "compatibility solution") developed by Microsoft and included in the Microsoft Windows line of operating systems, starting in 1995.

- **ISBN**: International Standard Book Number

- **JavaScript**: often abbreviated as JS, is a high-level, interpreted programming language that conforms to the ECMAScript specification. It is a programming language that is characterized as dynamic, weakly typed, prototype-based and multi-paradigm. Alongside HTML and CSS, JavaScript is one of the core technologies of the World Wide Web. JavaScript enables interactive web pages and is an essential part of web applications. The vast majority of websites use it, and major web browsers have a dedicated JavaScript engine to execute it.

- **LMW**: The system that we are describing in this document is a Library Management Website, for this reason when we refer to it on the document we write the acronym.

- **Logging in**: (or logging on or signing in or signing on) is the process by which an individual gains access to a computer system by identifying and authenticating themselves. The user credentials are typically some form of "username" and a matching "password", and these credentials themselves are sometimes referred to as a login, (or a logon or a sign-in or a sign-on). In practice, modern security systems also often require a second factor for extra security. When access is no longer needed, the user can log out (log off, sign out or sign off).

- **Megabyte**: is a multiple of the unit byte for digital information. Its recommended unit symbol is MB. The unit prefix mega is a multiplier of 1000000 (10^6) in the International System of Units (SI). Therefore, one megabyte is one million bytes of information. This definition has been incorporated into the International System of Quantities.

- **Mozilla Firefox**: (or simply Firefox) is a free and open-source web browser developed by The Mozilla Foundation and its subsidiary, Mozilla Corporation.

Firefox is available for Windows, macOS, Linux, BSD,illumos and Solaris operating systems.

- **MY SQL Server**: My Structured Query Language is an open source relational database management system

- **MS Windows 10**: is a series of personal computer operating systems produced by Microsoft as part of its Windows NT family of operating systems. It is the successor to Windows 8.1 and was released to manufacturing on July 15, 2015, and broadly released for retail sale on July 29, 2015. Windows 10 receives new builds on an ongoing basis, which are available at no additional cost to users, in addition to additional test builds of Windows 10 which are available to Windows Insiders. Devices in enterprise environments can receive these updates at a slower pace, or use long-term support milestones that only receive critical updates, such as security patches, over their ten-year lifespan of extended support.

- **Opera**: is a web browser for Microsoft Windows, Android, macOS, and Linux operating systems. Opera Ltd. is publicly listed on the NASDAQ stock exchange, with majority ownership and control belonging to Chinese Businessman Yahui Zhou, creator of Beijing Kunlun Tech which specializes in mobile games and cybersecurity specialist Qihoo 360. Opera is a Chromium-based browser using the Blink layout engine. It differentiates itself because of a distinct user interface and other features.

- **PHP**: Hypertext Preprocessor represents the backend technology used to interface the database with the model of the application.

- **Random-access memory RAM**: is a form of computer data storage that stores data and machine code currently being used. A random-access memory device allows data items to be read or written in almost the same amount of time irrespective of the physical location of data inside the memory. In contrast, with other direct-access data storage media such as hard disks, CD-RWs, DVD-RWs, and the older magnetic tapes and drum memory, the time required to read and write data items varies significantly depending on their physical locations on the recording medium, due to mechanical limitations such as media rotation speeds and arm movement.

- **Safari**: is a graphical web browser developed by Apple, based on the WebKit engine. First released on the desktop in 2003 with Mac OS X Panther, a mobile

version has been bundled with iOS devices since the iPhone's introduction in 2007. Safari is the default browser on Apple devices. A Windows version was available from 2007 to 2012.

- **SQL**: Structured Query Language

- **SRS**: Software Requirement Specifications

- **User (patron or Library members):** is a person who utilizes a computer or network service. Users of computer systems and software products generally lack the technical expertise required to fully understand how they work. For this document, a user is a person who has an account, and by this account, he/she can have access to material in the library.

- **Web application or web app**: is a client-server computer program which the client (including the user interface and client-side logic) runs in a web browser. Common web applications include webmail, online retail sales, and online auction.

Appendix B: Analysis Models

Model diagrams

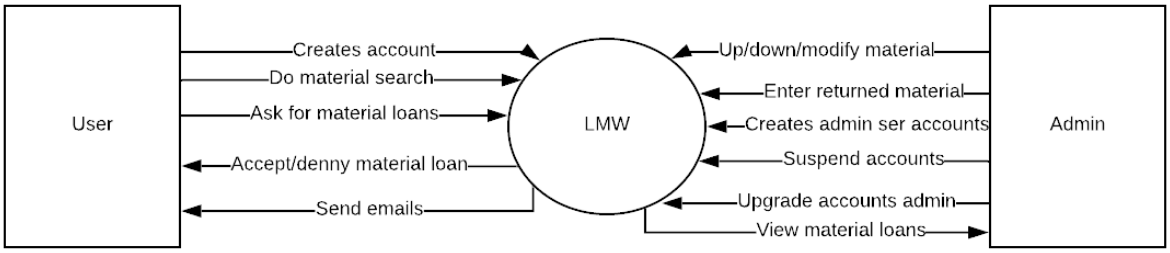

Figure 3. Architectural diagram

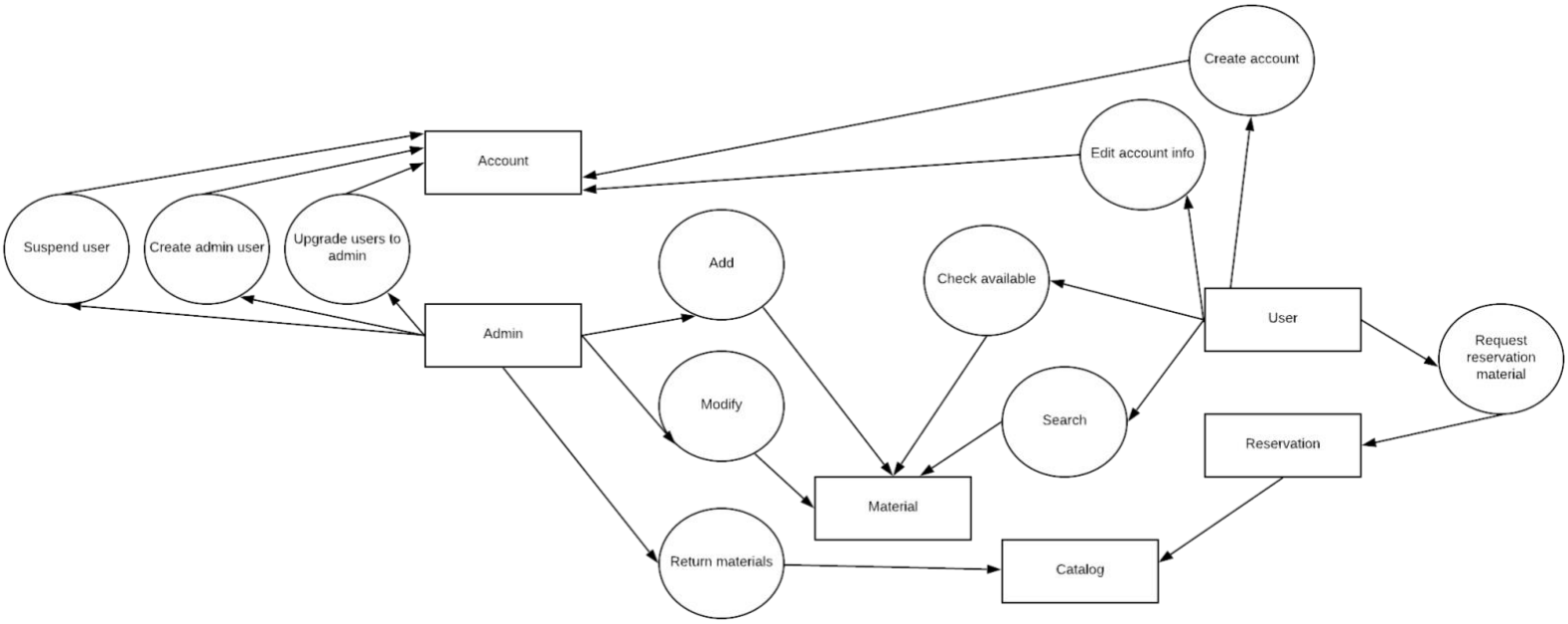

Figure 4. Flow diagram

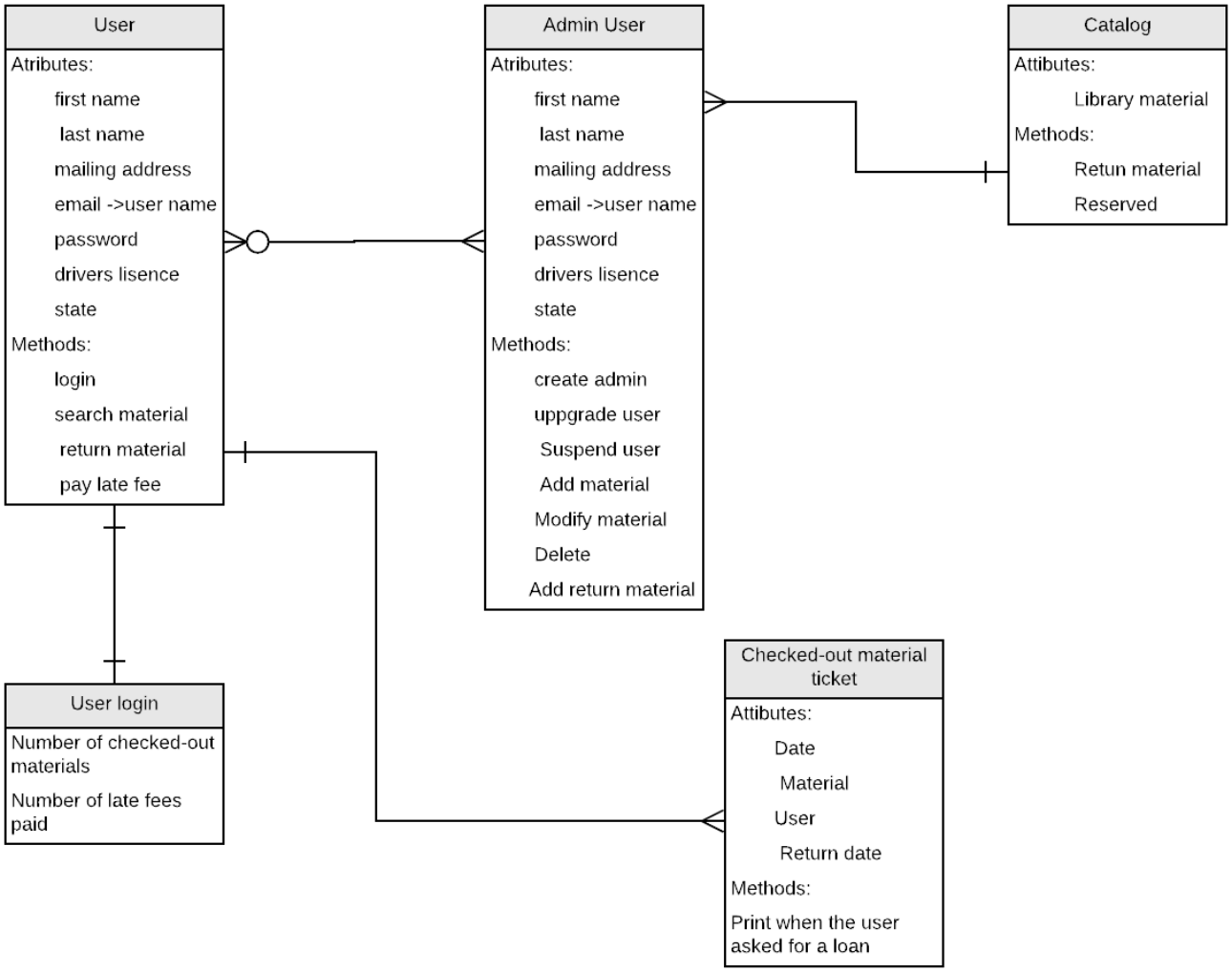

Figure 5. Entity Relational Diagram