**LIBRARY MANAGEMENT INFORMATION SYSTEM**

**CASE STUDY: INSTITUT FRANCAIS DU RWANDA**

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**BBICT/2022/45720**

**This Project Proposal is Submitted in Partial Fulfilment of Requirement for the Mount Kenya University Award of BACHELOR OF BUSINESS INFORMATION COMMUNICATION TECHNOLOGY**

**FEBRUARY 2024**

# **DECLARATION**

I hereby declare this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at Mount Kenya University.

Name: Eunice UMUHIRE

REG NO: BBICT/2022/45720

Signature: ………………………………… Date: ……………………………………….

SUPERVISOR

I, the undersigned do hereby certify that this is a true report for the project undertaken by the above-name Student under my supervision and that it has been submitted to Mount Kenya University with my approval.

Name: Dr Douglas NYABUGA

Signature: …………………………………. Date: ……………………………………….

# **DEDICATION**

This Work is dedicated

To the almighty God

To My Blessed Family and Friends

To My Prestigious University, Admirable Lecturers and Exceptional Classmates

**ACKNOWLEDGEMENT**

First and foremost, I want to thank the Almighty Heavenly Father for giving me life and all I needed. Your love means more to me than words can say, so thank you for always being there for me during this academic journey and for giving me strength at every turn.

I want to sincerely thank my parents for helping me to meet the requirements of this project and for shaping me into the moral person I am today. They have also encouraged and supported me throughout. My deepest thanks also go out to my beloved brothers, sisters, and friends, who supported me in every way during my life and academic endeavors; without them, I could not have succeeded.

I owe a special gratitude to my supervisor, Dr. Douglas NYABUGA, whose essential advice and assistance allowed me to finish this assignment and reach the deadline in spite of a plethora of chores and obligations. I owe him a huge debt of gratitude for his meticulous oversight that made this endeavor a success.

I am grateful to the Academic staff and all Lecturers of Mount Kenya University for the services and knowledge extended to me through the eight semesters of extensive career shaping and skills.

**CHAPTER ONE: INTRODUCTION**

1. **Introduction**

A library management information system is a comprehensive software solution designed to streamline and automate the various processes involved in the functioning of a library. This system leverages technology to efficiently manage tasks such as cataloging, circulation, acquisitions, and patron management. The primary objective of an LMIS is to enhance the overall efficiency and effectiveness of library operations, ultimately providing a better experience for both librarians and library users. By integrating digital tools and databases, an LMIS facilitates easy access to information, improves resource utilization, and ensures the seamless organization of vast collections. The system's functionalities often include features like cataloging and classification, circulation control, inventory management, and report generation. Implementing an LMIS not only simplifies routine tasks but also enables libraries to adapt to the evolving landscape of information management, making it an essential component of modern library administration.

**1.1 Background of the Study**

Institut Français du Rwanda, located in the French-speaking cultural center of Rwanda in the Kimihurura sector of Gasabo district, is an institution that belongs to a large cultural network made up of more than a hundred French institutes around the world. The Institut Français du Rwanda aims to be a platform for exchange and dialogue intended to offer you several annual sessions of French courses, various cultural events, and also support for integrating into a French university. The Institut Français du Rwanda offers a wide choice of French courses. Whether you have spoken French before or need to take your learning further, you will find the course suited to your needs. The Institut Français du Rwanda also has a media library, which offers all the services of a library oriented towards the French-speaking world and allows you to consult related works on site, on loan at home, or through the digital library “culturetheque.” The media library currently has an adult section with novels and comics, a children’s section including albums and children’s novels, comics, and mangas, a learner’s library for French learners, and a children’s corner intended for toddlers. It also has a collection of books in Kinyarwanda and English. Users of the media library can communicate with its staff in both French and Kinyarwanda.

**1.2 Problem Statement**

TheInstitut Français library often focuses on providing resources related to the French language, literature, and culture. Several challenges exist that impede the effective dissemination and promotion of resources related to the French language, literature, and culture. They don't work seven days a week and also limits on hours to use library. Thus it hinders the leaders from using system. In addition, the system lacks automated updates on the new literatures and cultural books.

**1.3 Objectives**

**1.3.1 General objectives**

The general objective of the study is to develop a library management information system in the Institut Français library.

**1.3.2 Specific objectives**

1. To design a user-friendly interface that allows the admin and student to interact with the system.
2. Develop effective communication channels to keep users informed about updates, changes, and new features based on user preferences.
3. To implement a system that will generate reports of library.

**1.4 Scope and Limitation of the Study**

A French-speaking library provides a wide range of resources in the French language, including literature, history, arts, and sciences, serving as a cultural hub for the local community. It aims to foster language learning through diverse materials and technology-driven services. However, limitations may arise due to resource constraints, accessibility issues for non-French speakers, and cultural biases affecting niche interests. Despite these challenges, the library plays a vital role in promoting French language, culture, and education within its defined scope and community reach.

**1.5 Project Justification**

The library management information system is justified by its transformative impact on library operations, ushering in enhanced efficiency, accessibility, and resource management. By automating manual processes, providing seamless integration of digital resources, and ensuring data accuracy, a library management information system optimizes workflow, allowing librarians to focus on user services and community engagement. The system's robust security measures address privacy concerns, while its adaptability to technological advancements future-proofs library services. Through improved user experience, personalized services, and data-driven decision-making, a library management information system positions the library as a dynamic and relevant hub for knowledge dissemination, fostering increased user engagement and overall satisfaction.

**1.6 Project Risks and Mitigation**

The Project faces the risk of losing crucial data due to the computer crashes. The constructive solution to this risk will be the creation of external backup memory or online saving Storage where the data can be retrieved in case the crisis.

The project can be infected by malware such as virus and attack of intruders. The solution to this case will be the installation of antivirus software and firewall to protect the system from an external malware attack.

**1.7 Project Budget**

Table1.1: Project budget

|  |  |  |  |
| --- | --- | --- | --- |
| **Items** | **Quantity** | **Price(RWF)** | **Total** |
| Computer | 1 | 400,000 | 400,000 |
| Internet | - | 50,000 | 40,000 |
| Communication and transport | - | 20,000 | 20,000 |
| Backup devices | 4 | 40,000 | 40,000 |
| Training | - | 100,000 | 100,000 |
| Printing and binding | 6 times | 18,000 | 18,000 |
| Miscellaneous costs | - | 20,000 | 20,000 |
| **TOTAL** |  |  | **638,000** |

**1.8 Project Schedule**

Table 1.2: Schedule

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Work/time | February | | | | March | | | | April | | | |
| Weeks | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Chapter 1: Introduction |  |  |  |  |  |  |  |  |  |  |  |  |
| Chapter 2: Literature review |  |  |  |  |  |  |  |  |  |  |  |  |
| Chapter 3: Research Methodology |  |  |  |  |  |  |  |  |  |  |  |  |
|  |
|  |
| Chapter 4: Requirements analysis and modeling |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |
| Chapter 5:System design |  |  |  |  |  |  |  |  |  |  |  |  |
| Chapter 6: System implementation |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |
|  |  |
| Chapter 7: Recommendation & conclusion |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |

**CHAPTER TWO: LITERATURE REVIEW**

**2.0 Introduction**

This literature review serves to illuminate the pivotal role played by MIS in revolutionizing library management, user experiences, and service delivery and also seeks to elucidate the evolving role of technology in modern libraries, shedding light on the challenges, opportunities, and best practices associated with MIS implementation.

By synthesizing existing research, this review aims to provide a comprehensive overview of the current state of library MIS while identifying key trends and challenges within the field.

**2.1 Definition of key terms**

## 2.1.1 Library

A library is a collection of resources, typically books, manuscripts, documents, or other forms of recorded information, organized and maintained for public or private use. Libraries serve as repositories of knowledge, providing access to various materials for research, education, entertainment, and cultural enrichment.

## 2.1.2 Management

Management is the process of planning, organizing, directing, and controlling resources (such as people, finances, materials, and information) within an organization to achieve specific goals and objectives efficiently and effectively. It involves coordinating the efforts of individuals or groups to work towards common objectives, making decisions, and overseeing activities to ensure that they are aligned with organizational strategies and priorities.

## 2.1.3 Website

A website is a collection of related webpages and multimedia content that are hosted on a webserver and can be accessed through a web browser. Website are typically used to provide information, promote products or services, or facilitate communication between individual or organizations (Duckett, 2014).

## 2.1.4 Information

Data that has been processed and presented in a way that allows for human interpretation and creates meaningful tasks is referred to as information.

## 2.1.5 System

A group of parts or constituents arranged with a shared objective is called a system. The systems model consists of four fundamental components: input, process, output, and feedback. The term "process" refers to the actions taken to change inputs into the intended outputs. The raw materials or resources that will be converted into the product are represented by the inputs. The aspect of control is feedback (Meadows, 2008).

## 2.1.6 Information system

An information system is a comprehensive collection of interconnected parts used to gather, store, process, and distribute data as well as knowledge and digital goods. Information systems are necessary for businesses and other organizations to run their operations, communicate with suppliers and consumers, and compete in the market. Interorganizational supply chains and the electronic market are managed by information systems (Valacich, 2008).

## 2.1.7 Database

A database, according to Robbins, is an assortment of connected data. The database will assist us in keeping track of all system-related data, including user information, which includes names, contact information, borrow histories, and preferences. Data, including profiles, regarding students use library can be kept in the database (Robbins, 2016).

## 2.1.8 User

Any person who uses an application or accesses a website is referred to as a user.

**2.1.9 Table**

Ken White asserts that a table is a type of data structure that arranges data into rows and columns. Data may be displayed and stored in an organized manner using it (White, 2008).

## 2.1.10 PHP

A well-liked server-side scripting language for web development is PHP (hypertext preprocessor). Rasmus Lerdorf was the creator of it. PHP is a server-side scripting language that creates dynamic web content by running on the server. The client's web browser receives the generated HTML after that. Database interaction is supported extensively by PHP. With its ability to connect to several databases, including MySQL, Oracle, and PostgreSQL, developers may access and manipulate data stored in these systems. The database language MySQL was developed for managing and creating relational databases.

**2.1.11. Administrator**

An administrator is a person who is tasked with managing and supervising an organization's operations, rules, and systems.

## 2.2 Existing System

The program or system that is currently in use is referred to as the "existing system." The current system lacked an effective online mechanism, as well as accountability and openness in the contribution process.

## 2.3 Proposed System

A proposed system is a conceptual framework or plan that outlines a new or enhanced system that an organization wants to create and put into place to deal with certain problems or demands. It entails laying down the proposed system's goals, specs, features, and needs. Feasibility studies, user requirements, system architecture design, and implementation methods are a few examples of what this may include. Before moving on with the actual implementation, the suggested system acts as a roadmap for directing the development process and gaining stakeholders' agreement and support. Its objective is to offer a precise plan for introducing new technology, procedures, or features in order to solve current shortcomings or accomplish organizational objectives.

# **CHAPTER THREE: METHODOLOGY**

## 3.0 Introduction

This chapter describes the procedures for gathering data for research as well as the software tools that are utilized to gather information and data in order to make decisions. Publication research, interviews, surveys, and other research methods are possible components of the methodology.

The system development process is also covered in this chapter.

In software engineering, a system development methodology is a framework that is used to organize, schedule, and manage the process of creating an information system.

## 3.1 Data Collection and Procedures

We need to gather data in order to do research. One of the most crucial phases in the research process is data collection. Even with the best research, you won't be able to finish the project if the necessary data cannot be gathered. Depending on the research design and procedures used, there are numerous ways to gather data. Documentation, interviews, surveys, and observation are a few of the often­-used techniques.

## 3.2 Primary Data

## 3.2.1 Observation

According to Elke Van Documenting how people, things, and events behave without asking them questions or making eye contact is the technique of observation. The investigator uses their own direct observation to get information using the observation technique; they do not need to question the responder. If correct observation is made, the primary benefit of this strategy is the elimination of prejudice. This project employed this technique to gather field data (Rulo, 2014).

## 3.2.2 Interview

Asking research participants questions and receiving their responses is known as interviewing. There are several ways to conduct interviews, such as in-person group interviews and individual interviews. The phone and other electronic devices (like computers) can be used as a medium for questioning and replying. Structured, semi-structured, and unstructured online interviews are all possible. This project employed this technique to get information from system users.

**3.2.3 Documentation**

Using this method, the researcher can evaluate relevant literature, reviews, recollections, class notes, and websites. Giving definitions and more detailed information on the technical terms used in this study is made possible using this technique. Additionally, we have visited websites that discuss the idea and creation of a new information system as well as the analysis of the current information system.

## 3.3 Secondary Data

The researcher downloaded secondary data from the internet, periodicals, journals, newspapers, and library sources. Because of the data gathered in this specific case, they have been discussed in the second chapter's literature review.

## 3.4 Software Development Life Cycle

An approach used to illustrate how the proposed system will be built is called system development methodology. The waterfall model will be the mechanism employed in this instance.

## 3.4.1 Waterfall Model

It is made up of the steps the developer will take to create the system. As a result, the word waterfall refers to a sequence. A stage must be completed by the developer before moving on to the next. It comprises the system engineering or feasibility study phase, as well as the phases of analysis, design, coding, testing, implementation, and maintenance.

Throughout the course of developing this project, the researcher experimented with a variety of approaches, such as spiral, waterfall, and prototype, before settling on the waterfall model. This helped me to carry out my project; waterfall development approaches having the benefit of defining requirements in advance of programming and restricting requirements modifications as the project moves forward. The waterfall model is made up of several development phases that are carried out one after the other. A phase may only begin after the conclusion of its predecessor. At the last stage, the whole solution is made available.

Requirement and Feasibility

System Analysis

System Design

Implementation

Testing

Maintenance

Figure 3. 1: Waterfall Model (Harris, 2019)

## 3.4.1.1 System Engineering

To understand the library, the present system in use, and the problems with it, the developer will do research during this phase through participation, observations, and interviews. The data acquired will be utilized by the developer to assess the technical, financial, and operational feasibility of the proposed system.

## 3.4.1.2 Requirements and Analysis

Here, the developer will identify the issues that the system is meant to resolve and collect data on the requirements of the orphans. Additionally, the developer will provide library and user data. The developer will compile the necessary hardware, such as a computer and printer, as well as software requirements, such as the database model and programming language to employ.

## 3.4.1.3 Design

The developer will now create an overall system architecture as well as a physical design that includes the database and user interface. Before going on to the next phase, the developer will find any errors at this point. the result of the design specification, which is applied in the next execution phase.

## 3.4.1.4 Implementation

The developer will now start writing code in accordance with the design criteria. One or more product components that were constructed in accordance with a predetermined coding standard, debugged, tested, and integrated to meet the requirements of the system architecture are the result of this phase.

## 3.4.1.5 Testing

At this point, the developer will make sure that each integrated component and individual component are thoroughly checked to make sure they are error-free and meet user requirements. Unit testing of each individual code module, system testing of the integrated product, and user-conducted or user-sponsored acceptability testing will all be handled by the developer. Before going on to the next phase, the developer will make sure that any issues are fixed. Additionally, the developer will draft, edit, and release the product documentation.

## 3.4.1.6 Maintenance

Finally, this phase follows installation. It entails making changes to the system to boost efficiency. These are user-initiated modifications or the outcome of a previously unknown problem being found. These changes are noted for system updates and documentation.

**3.5 Software and Hardware Technologies**

## 3.5.1 Software

1. JavaScript
2. jQuery
3. HTML/CSS
4. Nodejs
5. Python3
6. Flask
7. SqlAlchemy

## 3.5.2 Hardware

1. RAM 4GB
2. Hard disk 250GB
3. System type 64-bit operating system, x64-based processor
4. Processor Intel(R) Core (TM) i3 CPU M 390

# **CHAPTER FOUR: SYSTEM ANALYSIS AND REQUIREMENT MODELING**

# **4.0 Introduction**

This chapter outlines the procedures that must be followed to accomplish the research's goals, which include outlining the various methods utilized to get information on the system that is already in use and describing the system that is being suggested. Activity diagrams and user cases illustrate how users engage with the system and its interface.

**4.1 Context Diagram**

A context diagram is a visual aid that presents a high-level overview of a system or process. It is sometimes referred to as a context-level data flow diagram (DFD). It depicts how the system under analysis interacts with other entities, including users, other systems, and organizations. A context diagram's primary goal is to illustrate the extent and bounds of the system under study as well as its interactions with external entities. By emphasizing the main inputs and outputs, it aids in understanding how data enters and exits the system (Kossiakoff, 2011).

ADMIN

DATABASE

USER

Figure 4.1. Context Diagram

## 4.2 Data Flow Diagram

A data flow diagram models the process features of an information system by providing a visual depiction of the "flow" of data through it. are frequently the first stage in the process of creating a system overview that may be gathered later. Data flow diagrams (DFD) illustrate how data moves through a system. It sees the system as a function that converts inputs into outputs. Before the output, data usually goes through a number of transformations in any complicated system. The DFD attempts to record the changes that occur to the input data inside a system in order to generate the output data at the end. A process is an agent that moves data from one state to another.

This DFD shows the movement of data through the different transformation or process in the system.

Start

STUDENT

ADMIN

Register &Login

Login

No No

Yes

Search Book Details

ADD Book

Issue Book Status

Update Book Details

Check Fine

New Book Issue

Search material

Download material

Return Book and Fine

My Profile

Update material

View material

Logout

Figure 4.2: Data Flow Diagram

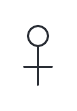
End

**4.3 User Case Diagram**

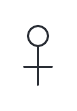
Typically, a user case diagram is understood to be a depiction of a user's interaction with the system and to convey the specifications of a user case. It can depict the many user types of a system, and other kinds of diagrams are frequently used to complete the case as well. Actor, User Case, and Association are the three main parts of the user case diagram.

**Actors** include users, operators, and other system participants.   
**Association:** Generally, associations are drawn without any explanation. These associations can be between an actor and a use case, or between user cases.  
**User case:** Procedure, Action, and Activity.

## 4.3.1 Administrator



Librarian Admin



User

Figure 4.4: User Case Diagram

**4.4 Activity Diagram of the System**

In the Unified Modeling Language (UML), an activity diagram is a behavioral diagram that shows how actions or activities move through a system. It provides an example of the steps, prerequisites, and critical decisions in a certain process or use case. An activity diagram might highlight a particular use case or procedure, or it can depict the workflow of the entire system. Activity diagrams provide a system or process's logic and stage a visual representation. They help determine possible bottlenecks or inefficiencies, assess, recording, and conveying the flow of operations, and comprehending a system's behavior from a process-oriented standpoint. Activity diagrams are useful at every stage of the software development lifecycle, from system design and requirements analysis to implementation and testing.

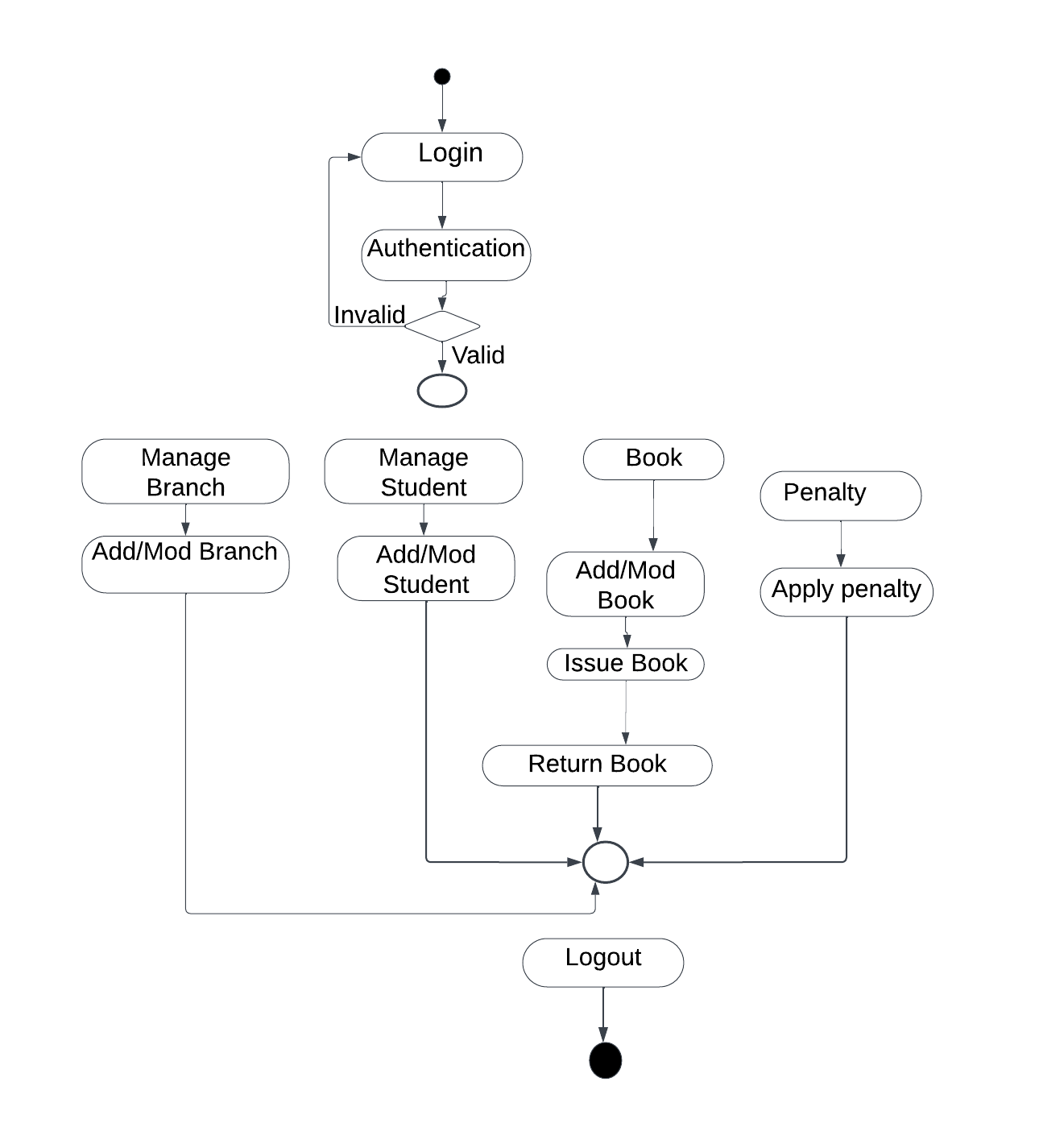


Figure 4.5: Activity Diagram

# **CHAPTER FIVE: SYSTEM DESIGN**

## 5.0 Introduction

The process of establishing the architecture, modules, interfaces, and data for a system to meet predetermined requirements is known as system design. In this chapter, we will attempt to describe the technologies used in the construction of the new system, along with the new notion of how the application was designed. This chapter includes the development tools for the system as well as the testing methods required to ensure that its performance is accurate. The process of establishing the architecture, modules, interfaces, and data for a system to meet predetermined requirements is known as system design.

## 5.1 Interface Design

Interface design is the process of creating user interfaces with the goal of optimizing usability and user experience for hardware and software, including computers, household appliances, and mobile devices. These interfaces include features like easily navigable visuals to help users feel comfortable using the system and get the job done without risk.

## 5.1.6 Entity Relationship Diagram (ERD) Of SYSTEM

It displays entity information, database table details, and table descriptions for every database table.  
The database that users will publish information about their papers into, search for documents, and store user-specific data like login credentials is the platform that the system will utilize.

# **CHAPTER SIX: SYSTEM IMPLEMENTATION AND TESTING**

## 6.0 Introduction

In the field of information technology, system implementation describes the act of implementing a hardware or software system into a company or setting. In order to make that the system satisfies the requirements and performs as intended, it entails the actual installation, setup, and deployment of the system. The process of bringing a planned system into use or turning it operational is referred to as system implementation. It entails converting the needs and system specifications into a workable system that end users may utilize.

## 6.1 Software Technology

A computer program used by software developers to design, debug, maintain, or support other programs and applications is called a programming tool or software development tool. Typically, the phrase describes a set of somewhat straightforward programs that may be used in tandem to complete a task. Productivity using a range of tools is half the mark of a professional software developer. Open-source code editors with a compiler or interpreter are the most fundamental tools; they are constantly and widely used. The extent to which other tools are employed varies based on the language and development process.

## 6.1.1 Tools and Languages used

Different tools and programming languages, both client-side and server-side (front and back end), are utilized in the design of this website in order to access the operating software programs.

## 6.1.2 HTML

Hyper Text Markup Language, or HTML for short, is the common markup language used to create webpages and web applications. It is the fundamental technology that powers the way material is organized and displayed on the Internet. The structure and layout of a web document are specified by the HTML tag and attribute system.

## 6.1.3 PHP

The server-side programming language PHP, or Hypertext Preprocessor, is mostly used for web development. It is a well-liked and extensively used language for developing dynamic, interactive webpages and online apps. PHP code runs on the server and produces HTML output, which is subsequently delivered to the web browser of the client to be displayed. For server-side web development, PHP is a strong and adaptable programming language that provides an easy method for building dynamic and interactive online applications (W3schools, 2019)

## 6.1.4 MYSQL

A popular open-source relational database management system (RDBMS) for organizing and managing structured data is called MySQL. Recognized for its dependability, efficiency, and user-friendliness, this database system is among the most well-liked and extensively used. Web applications, content management systems, e-commerce platforms, and numerous other situations requiring the storing and retrieval of structured data frequently employ MySQL. Because of its reputation for reliability, scalability, and simplicity of integration, it is a preferred option for websites hosting both small- and large-scale applications (Merriam webster, 2019).

## 6.1.5 JavaScript

High-level programming languages like JavaScript are mostly utilized to create dynamic and interactive websites. It is well known as the web's scripting language and is compatible with all current web browsers. JavaScript is a potent programming language that improves a website's functionality and engagement. It is essential to contemporary web development because it enables programmers to construct intricate online apps and interesting user experiences (W3schools, 2019).

## 6.1.6 CSS

Cascading Style Sheets, or CSS for short, is a language for style sheets that describes how an HTML or XML page is displayed visually. It is a key piece of technology in web development that manages the style, formatting, and arrangement of online pages. Together with HTML and JavaScript, CSS allows web pages to be interactive and aesthetically pleasing. It makes it simpler for developers to update and manage a website's visual elements and allows for uniform design, style, and presentation across numerous web pages (W3schools, 2019).

**6.2.5 Bootstrap**

A front-end web framework that is free and open-source for creating websites and online apps is called Bootstrap. It includes optional JavaScript extensions along with HTML and CSS-based design templates for buttons, forms, typography, navigation, and other interface elements. In contrast to many other web frameworks, it focuses solely on front-end development.

**6.2 System Testing**

Testing an entire, integrated software product is known as system testing. Software is typically just one component of a bigger computer system. Software ultimately interfaces with hardware and/or other software systems. Actually, system testing is a set of tests designed specifically to put the entire computer-based system through its paces. Software testing's black box testing area includes system testing. Testing a software application's internal operations or code is known as "white box" testing. Black box or system testing, on the other hand, is the reverse.

**6.2.1 Objective of System Testing**

Software testing offers an impartial, unbiased perspective of the program, enabling the company to see and comprehend the risks associated with using it. Testing need to methodically identify various mistake types in the shortest amount of time and with the least amount of work. Testing also shows that the program seems to be operating according to the specification, which is a bonus. The amount and dependability of the program may also be inferred from the data gathered during testing. However, testing can only reveal the existence of software flaws; it cannot demonstrate a defect's absence.

## 6.2.2 Testing Plan

A testing plan is a written document that outlines a methodical procedure for testing a software or hardware system. Usually, the strategy includes a thorough grasp of the final workflow. The method used to confirm and guarantee that a system or product satisfies all design specifications and other criteria is documented in a test plan document. Test engineers often design test plans or contribute significantly to their creation.

## 6.2.3 Unit Testing

Unit testing is testing carried out on a program or module by module basis. It can also refer to module testing at times. Unit testing aims to find and minimize logic flaws that could have gone unnoticed during desk checking as well as execution issues that result in unexpected program terminations.

## 6.2.4 Validation Testing

System validation is a collection of procedures used to verify that every component—whether it be a job, a system need, a document, a service, or another element—is in accordance with its intended usage and functionalities. These activities are organized and executed during the course of the system's life cycle. Since validation is a genetic concept, it must be understood in the context in which it is used. Validation ascertains if the system satisfies user needs and organizational objectives while also complying with requirements and carrying out anticipated functions.

## 6.2.5 Integration Testing

Software testing's integration testing phase, often known as integration and testing, or I&T for short, is when separate software components are put together and tested together. It takes place before to validation testing but following unit testing. Testing that incorporates two or more modules that are connected to one another is known as integration testing. It is the process of assembling every module that makes up a program in order to test it.

## 6.2.6 Acceptance Testing

During the acceptance testing phase of software testing, the program is examined to see whether it satisfies the requirements and is prepared for deployment. User Acceptance Testing (UAT) and System Acceptance Testing (SAT) are the two categories under which it falls. While SAT entails verifying the system against the technical and functional criteria, UAT involves end users testing the program to make sure it meets their needs.

## 6.2.7 White Box Testing

White box testing is a type of software testing where the main objective is to analyze a program's underlying logic and structure. Using this method, testers may make sure that every component of the code is functioning properly by examining the pathways, branching, and data flows of the code. It is often referred to as structural testing or transparent box testing.

**CHAPTER SEVEN: LIMITATION, CONCLUSION AND RECOMMENDATION**

## 7.0 Introduction

This chapter reviews the goals of the system development process, taking into account any potential obstacles, restrictions, suggestions, and findings.

## 7.1 Limitation

The main obstacle the developer encountered when gathering data was the difficulty in accessing information. Another time constraint was that acquiring various system needs turned out to be time-consuming since diverse persons in positions to supply such information were not always available. In addition, coding took sufficient time.

## 7.2 Conclusion

As a result, we made every effort in the project's design to give the user as much easy navigation, data retrieval, and essential feedback as we could.   
This project gives the user access to an online system for online library administration, which allows them to check out and return books. The ability to return or add books to their account, as well as see the contents of their status, should be simple for the student.   
Numerous elements offered by the online library system are intended to increase student convenience.   
This project aids in comprehending how the system creates a dialogue and transparency between the learner and the book librarian.

## 7.3 Recommendation

The developer advises fellow developers to pick up a new language to work in and keep improving their programming abilities. Future developers still have a long way to go in this industry, particularly in internet of things projects where improvements and modifications may be made with ease. Thus, they are able to create a system that includes features like integrated charging and offline memory.