Integrated Library Management System

Addis Ababa University Center of Information Technology and Scientific Computing

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Project Proposal Document

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Abstract

In information technology one of the most important developments in recent years is that of manual systems are being replaced by computer automated management systems. Currently, starting from a small organization to a large size organization each and every one is opting computerize systems for faster and secure access of data.

An effective management system is a crucial factor in a successful working of Automated Library Management System in any university. Until, recently, they have to go through such inefficient and potential error-prone means as processing manuals, just to gather up the information and also to work smoothly.

This project is specifically designed for Addis Ababa Institute of Technology library. It is closely related to and overlapping with data management. It entails retrieving, acquiring and maintaining information. It helps in the organization and control of the structure, process and delivery of an effective service to manage AAiT library.

The Library Management System maintains records related to Stock Maintenance, Book Search, Book Issue, Fine Collection and all necessary requirements for the Library to manage day to day operations. The supplementary web page notifies users the type of books students read most in the library to avoid congestion.

Acronyms

AAiT – Addis Ababa Institute of Technology

BC - Before Christ

OOP – Object Oriented Programming

B.Sc. – Bachelor of Science

DVD – Digital Video Disc

CD – Compact Disk

QR – Quick Response

ISBN – International Standard Book Number

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1. Introduction

1.1 Background

The sharing and accusation of Information and literature has been the foundation for the advancement of human civilization in all social, economic and scientific aspects. Being able to share, acquire and preserve resources such as information have insured that knowledge is transferred to generations to come furthermore the sharing of information and knowledge has led to progressive, diversified and innovative collection of knowledge and information. As the variety and quantity of the information and related resources accumulated through time and the ever growing contributors, a well-organized and capable institutions where needed to manage the huge collection of information and related resources. Libraries are among these institutions and in fact the oldest institutions in human history set up to handle and manage resources such as information and their history dates back to the first civilizations of Mesopotamia and summer as far as 2600 BC.

Formal and current definition of library states that library is a collection of sources of information and similar resources, made accessible to a defined community for reference or borrowing and provides physical or digital access to material. Now days libraries are not only physical buildings or rooms, libraries can also be virtual spaces or both. The collection of items and information has also diversified through times these days many libraries contain collections of books, periodicals, newspapers, manuscripts, films, maps, prints, documents, microform, CD s, cassettes, videotapes, DVD s, e-books, audio books and so much more. Libraries need to keeping up with the diversifying and growing collection of their resources and manage them efficiently and to do so libraries need to engage themselves in improving the way they handle and manage their resources by using up to date and standard technologies of managing their resources. Part of this may be automating some of their systems and also providing essay and user friendly way for their users to access the library resources.

The Addis Ababa Institute of technology (AAiT) library was established in 1953 when the AAiT (Formerly the College of Engineering) was first established by the Ministry of Education of

Ethiopia, and was housed in a set of building in the compound of Technical School of Addis Ababa. Initially, only a two year program of Intermediate Engineering studies was offered and students were subsequently sent abroad for the completion of the student leading to a Bachelor of Science degree (B.Sc.). At this time, the Library was holding about 9,000 volumes and over 300 titles in Periodicals. And now the library possesses about 30, 000 volumes of books.

Addis Ababa Institute of Technology (AAiT) Library system which is a leading engineering Information Center in the country which has large number of users has been providing services to the Institute Community, Scholars and Professionals in engineering and related fields of studies. The AAiT Library plays an important role in supporting the Institute Mission of excellence through teaching and research by making information resources easily, timely and efficiently accessible to all its potential users. For such purposes, building strong libraries for teaching and research is necessary for any academic institution. The AAiT library provides the vital core services by facilitating and improving the teaching and learning process of the Institute. As the "heart of the Institute", the AAiT library dutifully supports all students to tap the resources when searching for new knowledge and to clarify or to strengthen the knowledge they already possess.

The Institute Library is headed by a Head, Librarian. The Institute Librarian have an overall responsibility for the well-functioning and development of the Library system. The AAiT library has structured by both academic and administrative support staff. The AAiT Library have two divisions namely Technical and Public Services Division. The technical division oversees things such Acquisitions (Books Selection, Ordering and Receiving based on the list sent) and receiving cataloged materials and send books to Central Cataloging Department to be cataloged. The other that is the public Services Division is responsible for development and implementation of information services to users of the Library in co-operation with concerned Work Units and Services. It has also a general responsibility for coordinating users' instructions and identifying training needs of the staff and for arranging the same when approved. The Division also handles external relation and publicity of the Library system.

Over all the AAiT library is and has been striving to provide dynamic and complex library and information services which require up-to-date and uninterrupted attention, by trying to ensure

services of the highest quality with abundant access to relevant literature in both print and electronic formats with a qualified staff, because libraries must be the core of university teaching, learning and research.

1.2 Existing System

The AAiT library just as most libraries in our country has been using the old standard way of handling and managing library resources and library clients/participants which make use cards, papers and pens. Recently though the library has partially automated its system and also introduced digital library service which Manages the Institutes/Department digital repositories; Collects electronic theses and dissertations in CDs from departments/graduate offices; prioritize a range of e-resources for subscription and acquisition Identifies and selects library materials/ collections to be digitized further more Organize e-journals from different sources Provide electronic journals service to users in addition Ensures the access to electronic resources availability for users.

One of the recently introduced system to partially automate the libraries is an open source library management software called Koha which the AAiT library uses partially to manage and handle the library operations. This software is also an online service which requires connection to work thus making it difficult to perform while there is an interruption in connection. Another fairly recently introduced system is an on line catalog website where member student's login and view search books that are in the Addis Ababa University (AAU) library collection and since the AAiT being under the AAU it is included in this catalog system.

Not everything in the library is automated. The library still uses old way of managing and handling resources for short term loan (2 to 3 hours) which make use of pen and papers. Although there is a automated system for long term loans and other operations of the library it is not being fully used and utilized because of accessibility issues.

1.3 Statement of the Problem.

The library has many challenges, Automation and basic technological adaptation are by far needs more attentions. Longer steps and duplication of works are series bottle necks for the efficient service addressing of the library. Shortage of proper number of employee including professional librarians in regarding the size of the services and the library contain in balance approach and clear dissatisfaction and complaints of the end users. Also the lack of consistency of the online and automated systems has made the system unreliable for the user and the students.

The current system running, which is an open source software and an online based system poses some difficulties since the system is not tailor made for the institutes' library, it is a bit difficult to entertain the libraries specific requirements further more since the system fully depends on running online connection interruptions hamper the system from effectively providing its services. Making difficult to rent, return, register or any other library activity which depend on the system. Forcing the librarians to return to their old ways of using manual handling system to manage library activities.

The other is that the digital library and online catalog library lack a community around them that is students are not able to rate, review or comment on specific books to share the experience of that specific book and suggest each other which books are better suited for specific studies and researches. The option of rating, reviewing and commenting books gives others ideas about the books and which book to read from the Digital or the online catalog collections.

Furthermore, neither the digital library nor the online catalog suggest related books when the user searches a book and that book is currently unavailable. Over all the inconstancy of the digital and catalog systems has made them not to reside in the students' mind and limited them from being utilized efficiently and consistently. More could be done to adders these problems.

Finally, the current system doesn't provide a way to generate automated report such as reports on books issued or member students when needed.

1.4 Objective of the Project

1.4.1 General Objective

The general objective of the project is to facilitate the library of Addis Ababa institute of Technology with a simple and intricate Library Management System by building a desktop application and a web based system.

1.4.2 Specific Objectives

The specific objectives of the project includes:

- To provide an offline access to the library catalog
- Enable the librarians to check out and return books in a digitized and coordinated manner
- To provide notification of new books to the students
- Enable students and librarians to search for available books
- Provide students with easy access to interact with the library as a whole

1.5 Proposed System

Generally Library Management Systems are divided into offline management systems and online management systems. Offline systems have the capability to add books that are purchased recently in the Library, search members of the library using certain requests, search books using different categories and give access to borrow and return books in quick time, while online systems can make reservations for available books anywhere and anytime, give updated information about current books in the library and provide students with easy access to interact with the library as a whole.

This project is supposed to fulfill both the offline and online features of a Library Management system which includes all the structures mentioned above, but in addition to that this project provides 3 important features:

- Suggestion system

  This is a mechanism where a user will be appointed to related books if not available based on their search.

- Rating system

  Which enables students to rate a book they have used or read which in turn helps other students to make decisions.

- Generating report

  This system generates two types of reports:

  - Student record report
  - Book Issued report

Student record report includes the books that he/she has borrowed previously and the time she/he has borrowed the book.

Book Issued report generates the books that are currently available in the library with their respective quantity.

1.6 Feasibility study

Undoubtedly the technological component is one of the factor through which a Library is set up these days. With the growing number of students and staggering number of books, managing a library is no longer becoming convenient with the traditional and outdated way. Using the right library management system is key for an efficient library which creates a productive environment for everyone. Freeing library staff from mundane tasks so that they can focus on delivering the best service for students.

AAiT library is trying to provide the acquired information within manageable time to its users. However, increase in the intake of students has created greater demand for library services and performance of each operation manually, makes it difficult to provide service to students without losing their time. As stated the existing system is profoundly an online system which can be adversely problematic for the librarians.

A full scale feasibility study was undertaken for testing the possibility of computerization of AAiT library. The standard feasibility measurement criteria will be discussed below.

1.6.1 Economic Feasibility

Analysis of the project's cost and revenues in an effort to determine whether or not it is logical and possible to complete is the idea of economic feasibility study. Since the linchpin of the study is the accuracy of the demand forecast and analysis of relevant economic patters and trends, we'll try to view the economic feasibility of the project's development and operating costs.

1.6.1.1 Development cost

Cost of personnel is excluded as it's going to be developed by students on the project. The department assigned consultants therefore advisory fee isn't an issue. The development soft wares are open source and have no cost whatsoever. Hardware cost is irrelevant as group members have access to PC

1.6.1.2 Operational cost

Operational costs of the proposed system are maintenance, personnel and hosting fees. Additional hard wares and their maintenance down the road can be considered as a downside of implementing the automated system. The system requires a trained personnel. However, training an employee costs little to nothing because it can be done by group members. Additional web fees are required for the supplementary web page. 12$ a year for the domain name and 10$ a month for hosting it.

As seen above the cost/benefit analysis has evaluated the effectiveness of the new system feasible, since the benefits outweigh the cost. The value of the system can clearly be understood and both the library staff as well as students benefit if is implemented.

1.6.2 Technical Feasibility

Since studying the feasibility of the proposed system requires considering its technical requirements, we'll try to compare these requirements with the technical capability of the organization.

Automated library system deals with modern technology that needs an efficient technical system to tune this project. All constraints must be in favor of better influence of the system. Keeping all these facts in mind we had selected the favorable hardware and software utilities to make the system to make the system more feasible.

The library management system requires a computer, which is available locally and can be obtained without a problem. The software utilities are compatible with the existing system.

The potential input of the system may include user and book details as well as date and time of borrow.

The outputs of the system are date and time the students need to return the book, history list of books a user has borrowed and screen flagged on the list of borrowers who haven't returned the book yet

1.6.3 Operational Feasibility

Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development.

The system we have designed is a library managing application which lets the user and librarians communicate easily for the convenient access and use of library materials mainly books. The developed system will solve pressing issues like finding books quickly and renting them to users to an appreciable degree. It also satisfies the requirements of the project equitably. The system will have a commendable compatibility with the existing library system by excelling the rate of interaction with the librarian and the "Person who goes to the library" and also by having more accuracy than the previous establishment, avoiding human errors, the system errors aside.

1.6.4 Schedule feasibility

The overall time we have allocated for the project is around three months. However the learning curve might affect the schedule feasibility of the project.

1.7 Scope and Limitations

This sub chapter provides modules contained within the Library Management System.

- **Authorization and Authentication Module**

This module is designed to assure the overall security of the system. Authorized personals are required to login into the system using their own identification number and password.

- **Member Maintenance Module**

This module provides access for authorized person to maintain member's profile such as searching, registering, removing and accessing records. In addition, it provides an option to generate Quick Response Code (QR Code) for a particular member which will be later attached to his/her ID. This enables the user to just scan the member's QR code to authenticate his identity before undergoing any transaction.

- **Book Maintenance Module**

This module is accessible to all users. Its main purpose is to sustain the book inventory record. It offers the user to add, remove and update records.

- **Book Transaction Module**

Book transaction module is a vital module in any Library Management System. When a member desires to borrow, return or register lost book, this module comes in handy. This module is accessible to both authorized personnel and member. When member wants to borrow a book, librarian needs to scan their member ID and status of the book before making it available.

- **Report Module**

This module presents the administrator various kinds of reports. These reports include :

- Transactions that occurred on a particular date
- List of most rented out books
- Transactions done by a specific member and their information
- List of reserved and available books
- List of members who surpassed their return date for a particular book

- **Search Module**

The one problem anyone faces in a library is searching for a specific book. The searching module provides a simple search mechanism to locate any book within the library. The search could be done via ISBN, book title, author and category.

- **Library Web Site**

This component is designed go help the members acquire information about any book without having to come in person to the library. It informs them whether a particular book is available or not.

1.8 Methodology

1.8.1 Data Collection

Datasets which are mandatory for the project are mainly gathered from the existing database of the AAiT library. Other information has been acquired by different interviews.

1.8.2 Description of Datasets

The database includes different levels of information about books that are required by the student. It includes such details as title, author, subject and ISBN of each book. Another main asset of the database is that it involves a student databases with their respective information. The databases mentioned above will be updated accordingly to any adjustment that may occur in time.

1.8.3 Implementation

The project will be implemented based on an Object Oriented Programming Model. Object oriented approach combines data and process into single entities called objects. OOP provides a clear modular structure for programs. It offers such features as simplicity, modularity, modifiability, extensibility, maintainability and re-usability. In general OOP offers a reliable software development.

Benefits of Object Oriented Approach:

- Real-World Modelling: Object oriented system tends to model the real world in a more complete fashion than do traditional methods. Object are organized into classes of objects, and objects are associated with behaviors.
- Code Reusability: When a new object is created, it will automatically inherit the data attributes and characteristics of the class from which it was spawned.

- Improved Reliability and Flexibility: Object oriented system promise to be far more reliable than traditional systems, primarily because new behaviors can be built from existing objects.
- Easy debugging: If a particular object turns out to be a problem, it can be easily removed and replaced by different object

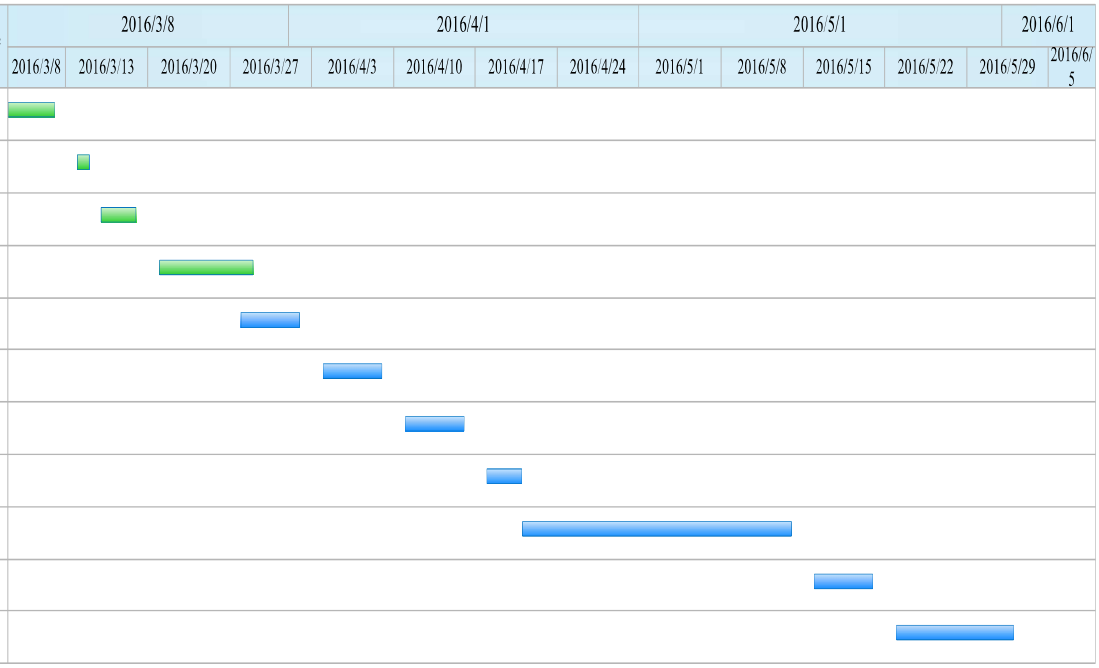
The project will intend in developing a Web based application that will be integrated with the desktop application. This application will provide students with easy access to the library. The platform that will be used on implementation will be selected based on accessibility and sustainability.

The project will be designed using the waterfall model. The Waterfall model is a sequential design process, used in software development process, in which progress is seen as flowing steadily downwards like waterfall through the phases of conception, initiation, analysis, design, construction, testing and implementation. The advantage of waterfall model is that it allows for departmentalization and control. It places emphasis on documentation and source code and provides a structured approach. The waterfall model was selected because it suits projects where requirements and scope are fixed, the product itself is firm and stable, and the technology is clearly understood.

1.9 Software Project Management Plan

1.9.1 Time Management Plan

ID	Task Name	Start	Finish	Duratio	Complete
1	Project Title	2016/3/8	2016/3/11	4.0 d.	100%
2	Selection of Methdology	2016/3/14	2016/3/14	1.0 d.	100%
3	Feasibility Report	2016/3/16	2016/3/18	3.0 d.	100%
4	Proposal Development	2016/3/21	2016/3/28	6.0 d.	100%
5	Requirement Analysis	2016/3/28	2016/4/1	5.0 d.	0%
6	Data Collection	2016/4/4	2016/4/8	5.0 d.	0%
7	Database Design	2016/4/11	2016/4/15	5.0 d.	0%
8	Class Modeling	2016/4/18	2016/4/20	3.0 d.	0%
9	Implementation	2016/4/21	2016/5/13	17.0 d.	0%
10	User Interface Desgin	2016/5/16	2016/5/20	5.0 d.	0%
11	Testing	2016/5/23	2016/6/1	8.0 d.	0%



1.9.2 Quality Management Plan

Quality control activities monitor and verify that the project deliverables meet defined quality standards. Quality assurance activities monitor and verify that the process used to manage and create the deliverables are followed and are effective.

Step 1 Quality expectations

The software is user friendly and the system will be able to rent out books and update the database in real time.

Step 2 Plan for quality assurance

We will provide a short term training for the users of the system so they will be able to use it easily and effectively

In case of system failure the system will be able to back up data that are found in the existing database

We will make the user interface easily adaptable and understandable and the user will be able to reach any navigation with a few number of clicks

Step 3 plan for quality control

Understanding the customer's role in the project success

Monitoring the quality of our own work

Assigning team members to part of the project they excel in

Do as much testing as possible to verify that the product meets the requirements

Accepting the feedback of our classmates during the development process

1.9.3 Communication Management Plan

The projects communication management plan will provide an approach for communications and support for the Library management system. The purpose of the communication management plan is to facilitate centralized communications between all identified team members. Combining the member's needs with methods of standardizing communications will enable processes for conveying project awareness, status and provide feedbacks.

Various types of the information are being communicated throughout the life of the Library Management System. For the purpose of this project four types of information categories have been determined:

- Project Description
- Project Planning
- Project Execution
- Project Control

A significant amount of the information communicated is focused within the Project team. The reason for this is the fact that a well-informed team is better prepared to effectively communicate strategy, goals, objectives and status of the project. As a result of the magnitude of meeting necessary to manage the project, the members will have face-to-face meeting to review project schedule and the current project status. We carry out further communications via social networks for status report and assessing our current status.

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