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DESIGN AND DEVELOPMENT OF LIBRARY MANAGEMENT SYSTEM OF CAGAYAN STATE UNIVERSITY

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Abstract: *The growing number of students and Faculty members is quite a dilemma for the maintenance and security of the library holdings which triggered the University to modernize the library. Conversion from manual to automated system has been the clamor of the users for quite some time yet this yearning is yet to materialize. Library staff members and borrowers alike find difficulty in the transactions which include borrowing, surrendering, cataloguing, and inventorying, among others. This study aims to convert the manual or paper-based library system into an automated system that will efficiently manage the transaction of borrowing and returning books. Complexity of the process may remain but the time in perfecting a process is remarkably reduced. In the software that has been designed and developed, technical and functional requirements were thoroughly studied and analyzed. In the software, transactional errors and tedium have been minimized thus making the library transaction efficient and effective. The methodology used in the development was the waterfall model therefore requirements specified by the user were really met. The implementation used is the phased strategy so that the new system would not totally eradicate the old one but to gradually efface the old system.*

Keywords: *Automation, Computerized Library System, Developments, Process, Paper-based transactions, Transactional documents*

INTRODUCTION

In the light of the rapid changes with the use of Information Technology, many tools, technologies, and systems have been produced and invented. IT has revolutionized the life of human beings and has made the lives easier by the various kinds of applications. Nowadays all the businesses are shifting to computer based system. The purpose to having a computer based system is, it helps increase the market share and it is very easy for customers to use. Library science (often termed library studies or - now dominating - Library and information science) is an interdisciplinary or multidisciplinary field that applies the practices, perspectives, and tools of management, information technology, education,

and other areas to libraries; the collection, organization, preservation, and dissemination of information resources; and the political economy of information.

Cagayan State University (CSU) is the first and only state run comprehensive institution of higher learning in Cagayan. It has shared its historic contribution to the development of tertiary education in the Philippines.

Rationalized on the issues of efficiency and effectiveness, college courses of other smaller institutions that were under the supervision and control of the former Ministry of Education, Culture and Sports (MECS) were made an integral part of the university system. These were the Aparri Institute of Technology (AIT), Bukig National Agricultural and Technical School (BNATS), Aparri School of Arts and Trades (ASAT), Cagayan Valley Agricultural College (CVAC), Sanchez Mira Rural Vocational School (SMRVS), Western Cagayan School of Arts and Trades (WCSAT) and Gonzaga National Agricultural and Technical School (GNATS).

There are seven campuses under the university system: CSU at Gonzaga, CSU at Lallo, CSU at Sanchez Mira and CSU at Aparri, CSU at Lasam, CSU at Piat, CSU- Caritan and CSU Carig were merged under one nomenclature, CSU- Tuguegarao. All campuses continue to operate as complementary satellites of the University.

Cagayan State University Library has been home to enormous volume of library holdings which served thousands of students and instructors over the decades. This library honed the research skills of the CSUans for it is not only a repository of physical books or other research materials but more importantly a repository of intricate and plethoric knowledge and wisdom embedded in these materials.

Various factors and challenges have caused to bring about the change from paper-based or traditional library to digital library systems. The fundamental reason to create digital libraries is better distribution of information compared to the past. Although traditional libraries are an integral part of society but they are not complete. This is also one reason why CSU Library has to shift from paper-based to automated library system.

At present the CSU Library caters to the needs of about 12,000 students and 100 teaching staff. The growing number of students and Faculty members, however, is quite a dilemma for the maintenance and security of the library holdings which triggered the University to modernize the library. Since the Conversion from manual to automated system has been

the clamor of the users for quite some time yet this yearning is yet to materialize. Library staff members and borrowers alike find difficulty in the transactions, they permit sophisticated searching of the Library stock, they link to the circulation control system so that not only can a borrower ascertain that the library service holds a particular item, they can also see its loan status at the time, the search facility of the catalogue is very flexible, These study might be a big help to cater the needs of Faculty and students of Cagayan State University. Barcode reader is equipped in this system so that users can enjoy the convenience without need to key in the barcode of the book themselves. It is convenience and time saving as the users can direct scan in the books barcode id when the members borrows book in one time. As CSU transforms into a dynamic university, it is but right for it to also adapt to the changes in technology, thus this system.

STATEMENT OF THE PROBLEM

The main problem in this study was how to Design and Develop a Library Management System. Specifically, this study sought to answer the following problems:

1. What are the significant steps and processes involved to design and develop the LMS of CSU?
2. How may the LMS for CSU be evaluated in terms of:
   a. Security
   b. User Interface
   c. Accuracy of Information
   d. Reliability of Data
3. What new features and functionalities could be integrated with the LMS of CSU?

METHODOLOGY

In order to answer the problems presented in this study, the researcher executed the developmental research approach which is focused on the progressive changes that occur as the system develops. The researcher assessed the current LMS to determine the technical feasibility of creating Library Management System. The researcher conducted an interview with the University Librarian, the staff of the library and the students as well for the requirements analysis and for the in-depth understanding of the problems with the current manual procedure of library.

Software life cycle models describe phases of the software life cycle and the order in which those phases are executed. The software development methodology used in this study was waterfall model. This is the most common and classic life cycle models, also referred to as a linear- sequential life cycle model. It is very simple o understand and use.

In a water fall, each phase is completed in its entirety before the next phase can begin. The researcher used this model to as a method in her study because she has already perceived the requirements need and the design of the system. The advantage of this model is the need to review the result of each phase before a next phase can begin.

The purposive sampling was used to identify the respondents. They were the Librarian, library staff and students of the University. The Cagayan State University – Andrews Campus has 12,000 students. The margin of error desired will be 5%. Therefore, applying the Slovin's formula: n = 12,000 / (1 + (12,000)(.05^2); n will be 387.09 which will be rounded off to 387. The sample size of the instructors must be determined by using same Slovin's formula. CSU-Andrews Campus has 100 instructors. The margin of error desired will be 5%. Therefore, applying the Slovin's formula: n = 100 / (1 + (100)(.05^2); n will be 80.

DATA ANALYSIS TOOLS

To be able to take a population sample, the Slovin's formula was used to figure out what sample size is needed to take. As the researcher knew something about the population, it became a big help to determine the sample size.

A sample size can be determined using the Slovin's (1960) formula, which is as follows:

Where:

$$\mathbf{n} = \frac{N}{1+Ne^2}$$

n = sample size

N = population size

e = margin of errors

1 = constant value

In analyzing the result of the evaluation on the usability, design, user friendliness, error handling, reliability and acceptability of the proposed system, the Likert scale method was made use. The formula used to compute and interpreting the result is as follows:

$$\textbf{Rating} = \frac{(SA*5) + (A*4) + (U*3) + (D*2) + (SD*1)}{\text{Total of Respondents}}$$

Where:

Rating= total result of the evaluation

SA = total number of respondents who answered **Strongly Agree**

A = total number of respondents who answered **Agree**

U = total number of respondents who answered **Undecided**

D = total number of respondents who answered **Disagree**

SD = total number of respondents who answered **Strongly Disagree**

Table 1. The Likert Scale Conversion Table

DESCRIPTION	VALUE	CONVERSION
SA	5	4.21-5.00
A	4	3.41-4.20
U	3	2.61-3.40
D	2	1.81-2.60
SD	1	1.00-1.80

STATISTICAL TOOLS USED

The researcher was guided by the objectives to determine the appropriate statistical tools to be used.

Frequency. This was used to quantify the number of the respondents falling into a class in a statistical survey for the variation of specified characteristics.

Percentage. This was used to determine the number of respondents. The formula used was:

$$\mathbf{P} = \frac{F * 100}{N}$$

Where:

P = Percentage

F = Frequency

N = Total number of Classes

Weighted Mean. This was used to determine the over-all description of the responses given by the respondents in each item in the questionnaire. The formula used was;

Where:

$$XW = \frac{WiFi}{Fi}$$

XW = Weighted Mean

WiFi = Sum of Weighted Frequencies

Fi = Number of respondents

SYSTEM DEVELOPMENT TOOLS

These are the different tools and techniques that the researcher used in developing the proposed system. These were utilized to better analyze the system needs.

Hierarchy-Plus Input Process Output (HIPO). The HIPO was used to plan and document the proposed system that utilizes a hierarchy chart to graphically represent the system's control structure. Using this technique, the researcher can evaluate and refine the systems' design, and correct flaws prior to implementation. Given the graphic nature of HIPO, the target users can easily follow a systems' structure. The hierarchy chart serves as a useful planning and visualization document for managing the systems development process.

Data Flow Diagram (DFD). The DFD was used to describe the transformation of inputs into outputs. This will be used to graphically illustrate the flow of data and logic within the system.

Entity-Relationship Diagram (ERD). The ERD was used to represent the various tables in relation to a very large database. It was also used to conduct data modeling activity. The attributes of each data object can be described using data object description.

Cross-Functional Flowchart. This was used in analyzing, designing, documenting or managing a process or a program. This chart allowed the author to locate the responsibility for performing an action or making a decision correctly, showing the responsibility of each organizational unit for different parts of a single process.

Database Tables. The database tables are essential components of the system as these serve as the repository of enormous amount of data that contain all information and transactions of the system. Without these tables, information would not be saved in an organized and systematic manner and retrieval, entry, and processing of data will be difficult to manage.

Conceptual Paradigm of the Study. Describes and shows the data inputs, and the desired outputs of the proposed LMS.

RESULTS AND DISCUSSIONS

1. **Significant steps and processes involved to design and develop the LMS of CSU; Assessment of the current process of the Library Management of Cagayan State University**

The CSU Library maintain a total number of 5000 books grouped into sections: general reference, general circulation, filipiniana, reserve, periodical and information file materials; general reference is the depository of encyclopedia,, manuals, charts, dictionaries, atlases, indexes, yearbooks, maps, globe, pjctures, almanac and handbooks; the filipiniana section is a collection of book written by Filipino or foreign authors; periodicals are publications issued at regular intervals such as newspapers, magazines, newsletters and journals.

Valuable articles that are clipped from magazines, newspapers and newsletter are collections from the information file materials. Some books are categorized as reserved or for circulation; books in the general circulation section is from 000-999. The classification numbers and their classifying category are posted on the access side of the open shelf corresponding with the classification of books sheltered therein to guide the users in locating the books they need. Reserve section is a section segregated from the circulation section intended to serve a specific need. This is place behind the charging desk for control purposes. The books in this section are of single copy which are designated by the faculty for one term use.

Here at CSU, the library uses the Dewey Decimal Classification as its classification system. The Dewey Decimal Classification, or Dewey Decimal System, is a proprietary library classification system created by Melvil Dewey in 1876 (Dewey, 1876). The library assigns a DDC number that unambiguously locates a particular volume to within a short length of shelving which makes it easy to find any particular book and return it to its proper place on the library shelves.

Book Borrowing is one of the service provided in the Library. Students uses the master card system which serves as the individual record of the student, showing the total number of books issued/ borrowed, as well as the number of books that were overdue. To be able to

borrow a book from the circulation section, a student must present his school ID to the circulation librarian who matches it with his/her master card. Before the book is released, the master card must first be filled up.

Book-registration is one of the old methods for bookkeeping which is currently practiced in the CSU library. In this method, registration of book identifications and information is done manually by library staff

The university library serves all CSU students, faculty members and employees. It is open from 8:00 a.m. to 12:00 p.m. and from 1:00 p.m. to 5:00 p.m. A student is entitled to borrow one book at a time and it should be returned within the period specified in the master card. Fiction or leisure reading books may be borrowed for one week but may be renewed for another week provided said books are not in demand at the time of renewal. All Reference materials cannot be brought out from the library, they may, however, be photocopied at the library's copier service. Books borrowed from the circulation section should be returned within the period specified in the master card and due-date slip. Periodicals are read within the periodicals area only. All books, pamphlets, journals and other reading materials borrowed from the library should be returned within the period specified in the master card and the due date slip.

Problems encounter by the current process of Library management

The following are the problems encountered in the existing system:

1. Wastage of time. searching for specific books is mostly done by users and it can be really cumbersome for researchers to look for a desired book in a long list of books on the book registration log. This can make the users exhausted and they may prefer to not use the library anymore. There is also slow transaction of borrowing and returning of books due to large number of borrowers but small number of library staff.
2. Loss of books: Tracking of borrowed books is difficult. For example, a member borrows a book for a specific period of time and does not bring it back on time, so the book is somehow lost because there is no automation process available, and someone else cannot use it anymore.
3. Security issues: There is no adequate security of transactional documents. Paper-based transactions are just kept in filing cabinets which are susceptible to natural calamities like typhoon, fire, etc.

4. Voluminous paper work: Since the library system is paper-based, an enormous volume of paper work is needed to keep records of at least 15,000 borrowers.
5. Cataloguing and inventorying of books and other library holdings are cumbersome: Book-registration is one of the old methods for bookkeeping which is currently practiced in the CSU library. In this method, registration of book identifications and information is done manually by library staff.

DESIGNING THE PROPOSED SYSTEM

Through the proposed LMS, It include activities that would involve the1) borrower: search for a book (title, name and author); 2) administrator: maintain book information (add/delete books), maintain database, view user details, and maintain user details; 3) library staff: issue books, return books, and add/delete books,. All these activities would be carried out in the system. The actual borrowing and returning of book will be done efficiently and effectively, thus, it can cater more students at a given time. Compared to a manual driven system each student will be given more time to finish the transaction. The proposed system permits sophisticated searching of the library stock. . It will allow searching items about the author, title and subject. The search facility of the catalogue is flexible

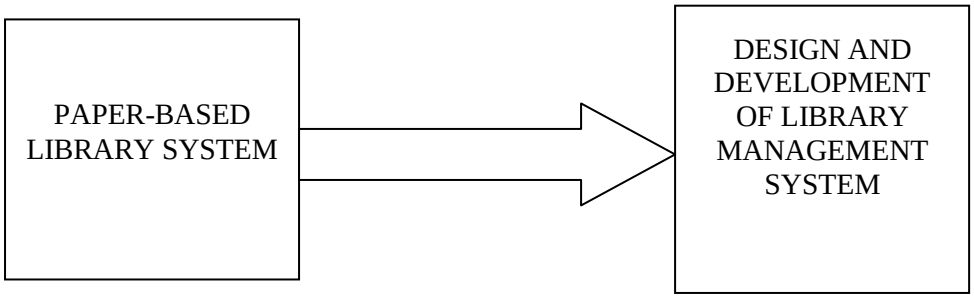


Figure1: Conceptual Framework

Figure 1 shows the conceptual framework of the study. It shows the idea on the transformation of paper-based library system into a Design and Development of Library Management System. The paper-based system (first box) is always prone to transactional errors and these cause too much cost on the part of the University. Loss of books, difficulty in cataloging, and voluminous paper work, among others, also affect the over-all image of the University Library.

The arrow shows the transformation of the paper-based library system to the Design and Development of Library Management System (second box). This would eradicate the above-mentioned problems. This will increase efficiency and effectiveness of the University Library.

Further, the system would save time in searching for specific books, borrowing, and returning of books; easily track borrowed books; reduce the cost in terms of maintenance; secure transactional documents; reduce voluminous paper work; easily catalogue books; and efficiently monitor the inventory of library holdings.

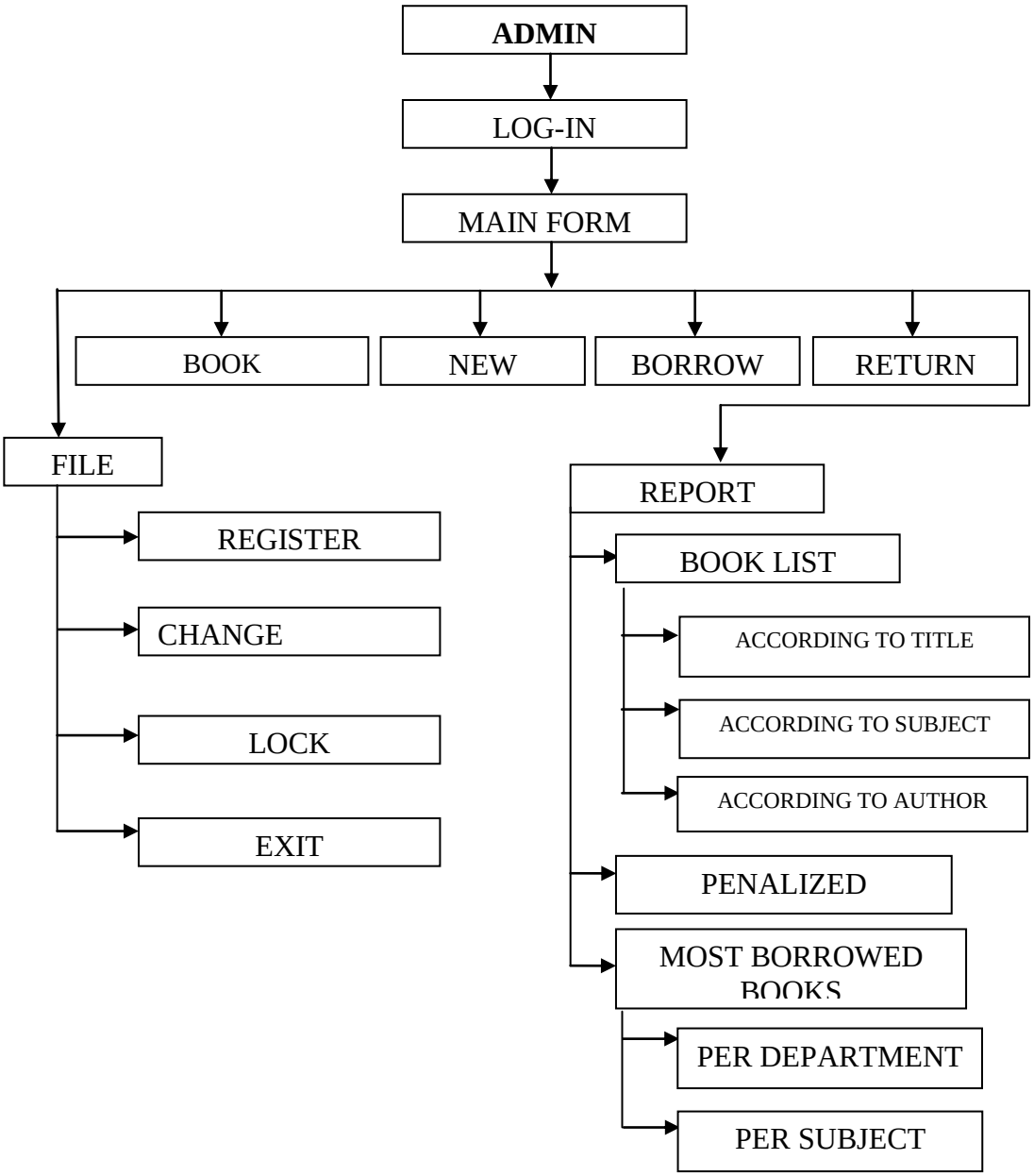


Figure 2 Hierarchical Input-Process-Output (Admin)

Figure 2 shows the Hierarchical Input-Process-Output concept of the system. This depicts the two main levels of users of the system: one is for administrator pertained to by "ADMIN"; and the other is client or guest user pertained to by "CLIENT". The "ADMIN" is a type of user account which enables the user to have full control of the system. The one

assigned to have this account is the librarian. In using this account, the user can log in using his log-in name and password. The main form would appear after correctly inputting his log-in name and password. The main form includes “FILE” and “REPORT” menus. “BOOK”, “NEW BOOKS”, “BORROW”, and “RETURN” are under the transaction menu. In the “FILE” menu, submenus include “REGISTER”, “CHANGE PASSWORD”, “LOCK APPLICATION”, and “EXIT”. The “REGISTER” is used to enter new user of the system. “CHANGE PASSWORD” is activated to change the password settings of a currently registered user. “LOCK APPLICATION” is the log-off mechanism of the system when the user logged-in needs to leave the post for quite some time. “EXIT” is used to turn off the system.

Under the transaction, “BOOK” menu shows the information about the existing books. “NEW BOOKS” is used to input newly acquired books. “BORROW” and “RETURN” are used to implement the transaction of actual borrowing and returning of books.

The “REPORT” menu includes the submenus: “BOOK LIST” (according to Title, Subject, and Author), “PENALIZED BORROWERS”, and “MOST BORROWED BOOKS”. These parts comprise the statistical data from the transactions made in the system. It would show essential information for decision making and policy formulation in the use of the system and the library as a whole.

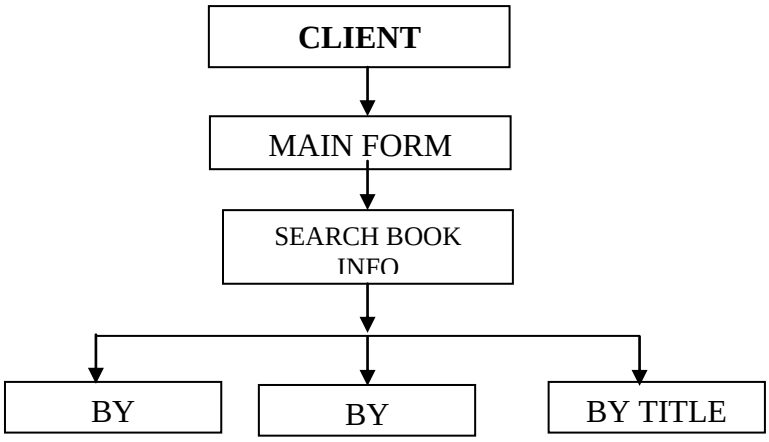


Figure 3 Hierarchical Input Output Process (Client)

Figure 3 shows the “CLIENT” account used by guest users who would like to know the availability of a book according to Title, Subject, or Author. This would be helpful in letting the borrower decide whether or not to come inside the library.

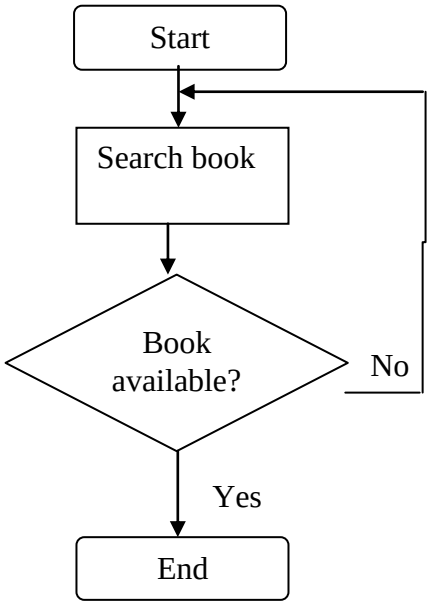
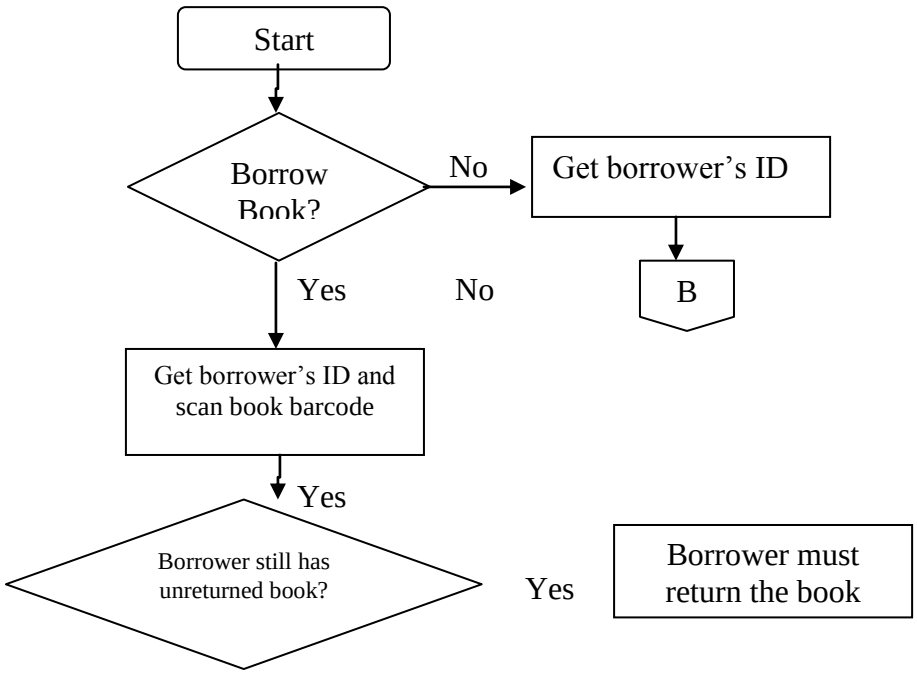


Figure 4 Cross-Functional Flowchart (Borrower)

Figure 4 shows the system flowchart of the borrower. In the manual system, the borrower looks into the availability of the book in the card catalogues that are stored in a cabinet. In the proposed system, the borrower just types in the book information and will immediately see if the book intended to be borrowed is available.



Cross-Functional Flowchart (Admin cont.)

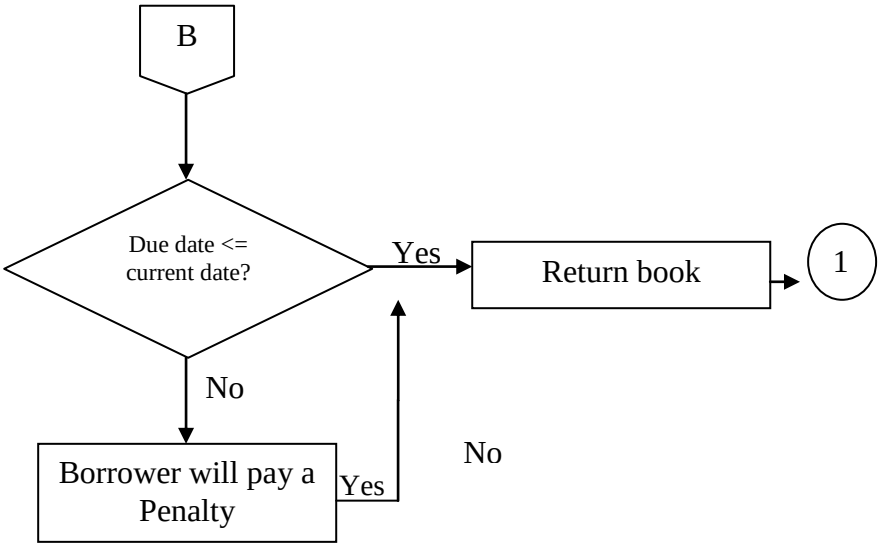


Figure 5 Cross-Functional Flowchart (Admin)

Figure 5 shows the transactional flow of the system on the administrator's side. It is in this aspect that the borrower successfully located the book he intends to borrow. In the manual system, the librarian gets the borrower's ID and keeps it in a filing drawer. The librarian then writes the borrower's information in the book card and inserts the said card in the pocket at the books back cover page. Having done this, the librarian logs in the name of the borrower in the log book.

In the proposed system, if the borrower intends to borrow a book, he surrenders his borrower's card and the bar code of the book will be scanned by a bar code reader. This is done more efficiently as it lessens the burden of writing information in various paper documents.

Figure 6 shows the Entity relationship diagram. It is an essential component of the database design as this layouts the foundation of the database. It establishes the relationship of the database tables in terms of connectivity. In this diagram, "tbkbookborrowed" is related to "tblborrower" which has a many-to-many relationship. This is so because a borrower can borrow one or many books. The same is true with "tblreturn" and "tblborrower" which has many-to-many relationship. "tblbookinfo".

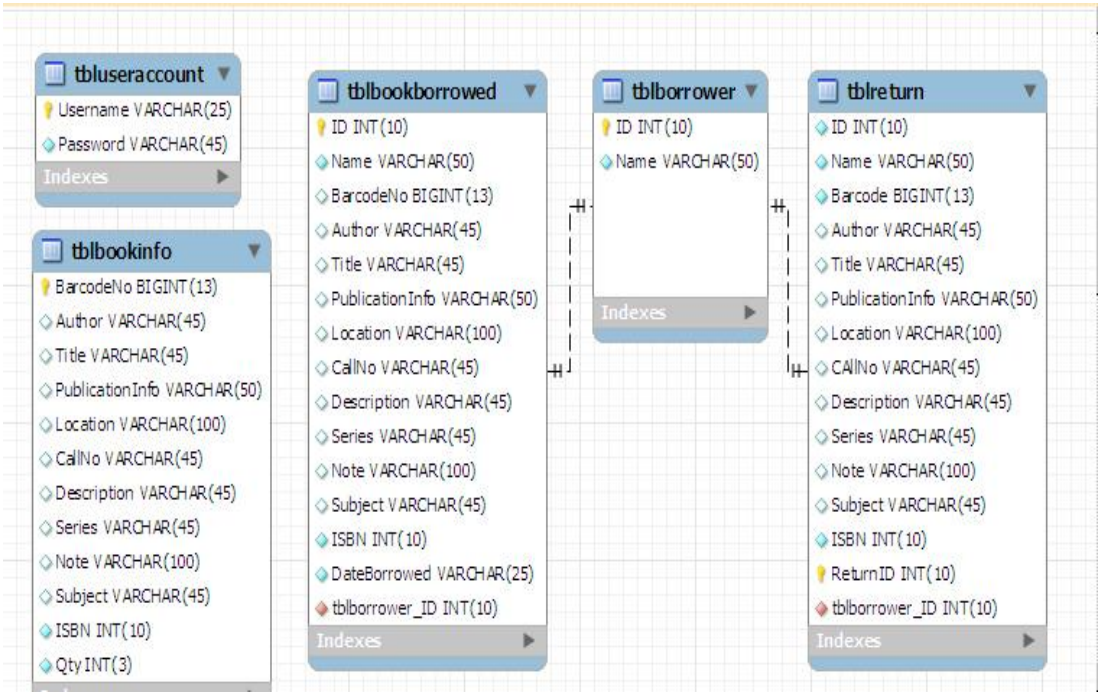


Figure 6 Entity Relationship Diagram (ERD)

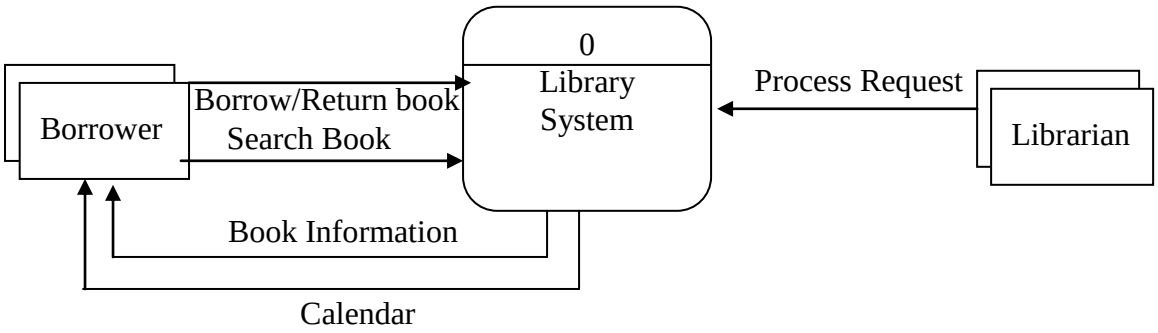


Figure 7 Data Flow Diagram (DFD) - Level 0

Figure 7 is the data flow diagram (level 0), otherwise known as Context Level Diagram, as depicted in Figure 7, shows the flow of information in the context level. The Library Management System contextually processes the requests of the borrower through the librarian who is the authorized user of the system. It covers from searching to borrowing to returning a book.

Figure 8 depicts the Level 1 data flow diagram of the system. It shows a more specific flow of information and processes of the system. In the diagram, the processes include encoding, borrowing/returning, searching, and generating book information or status.

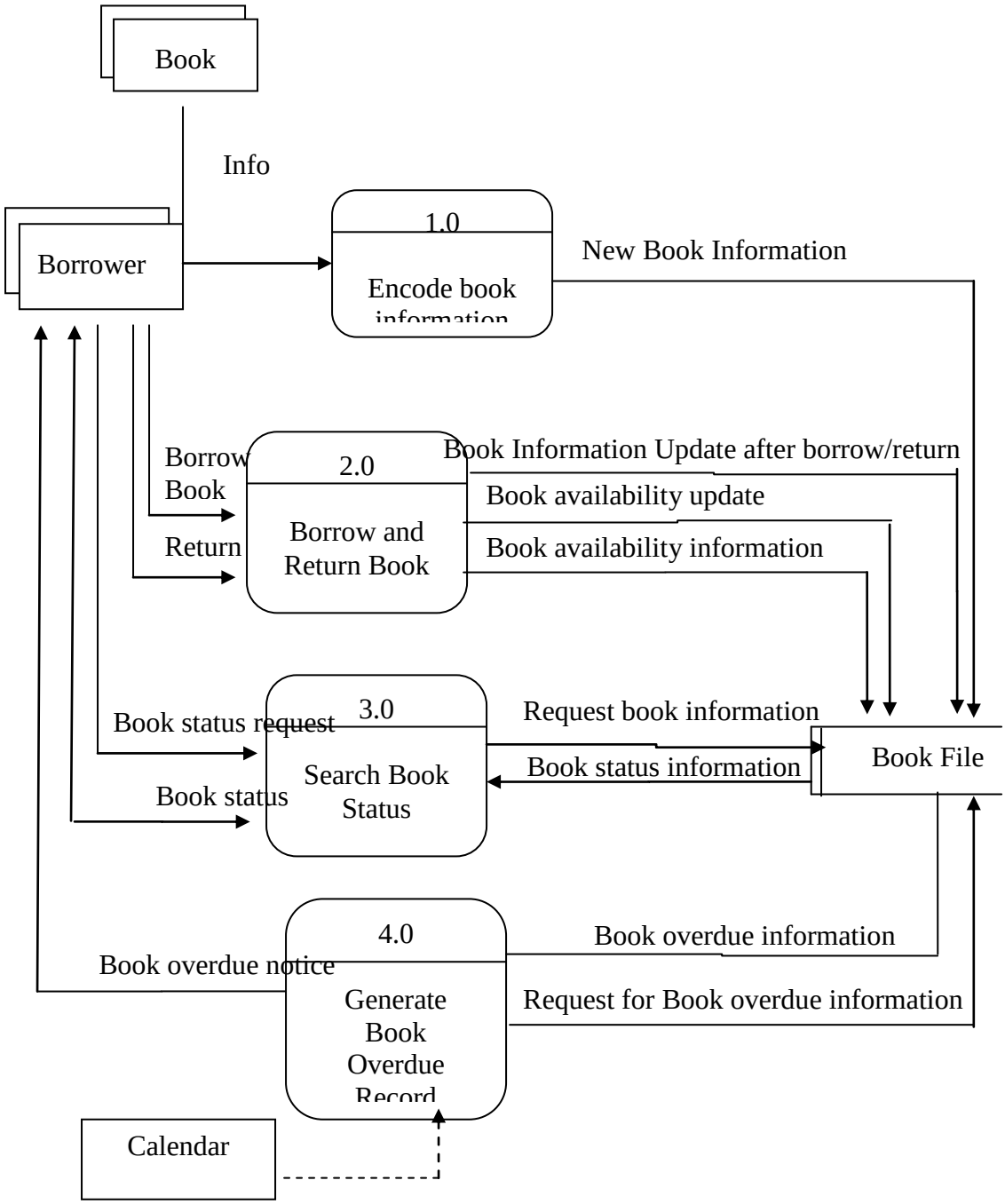


Figure 8 Data Flow Diagram (DFD) - Level 1

Testing. In this phase code is produced from the deliverables of the design phase during implementation and this was the longest phase of the software development life cycle. The researcher developed small programs then integrate in the next phase to check its functionality and to verify that the requirements meet the specification. Tests are done during this phase.

Here, work is divided in modules before the actual coding. the system is developed in small programs, which were integrated in the next phase. Each modules that is developed is tested for its functionality. The testing verifies if the modules meet the specifications.

These modules were consolidated according to fulfillment of objectives of the project study to be considered for functionality for the next phase.

Implementation. In this phase the implementation was tested against the requirements to make sure that the product solves the specifications addressed and gathered during the planning phase. The system as a whole was tested for its functionality.

This research employed the phased strategy of implementation. The phased approach takes the conversion one step at a time. The implementation requires a thoroughly thought out scenario for starting to use the new system. And at every milestone the researcher has to instruct the user. The old system was taken over by the new system in predefined steps until it will be totally abounded. The actual installation of the new system was done in several ways, per module or per product and several instances can was carried out. This was done by introducing some of the functionalities of the system before the rest or by introducing some functionalities to some users before introducing them to all the users. This will give the users the time to cope with the changes caused by the system.

Some of the essential feature of the LMS includes the following:

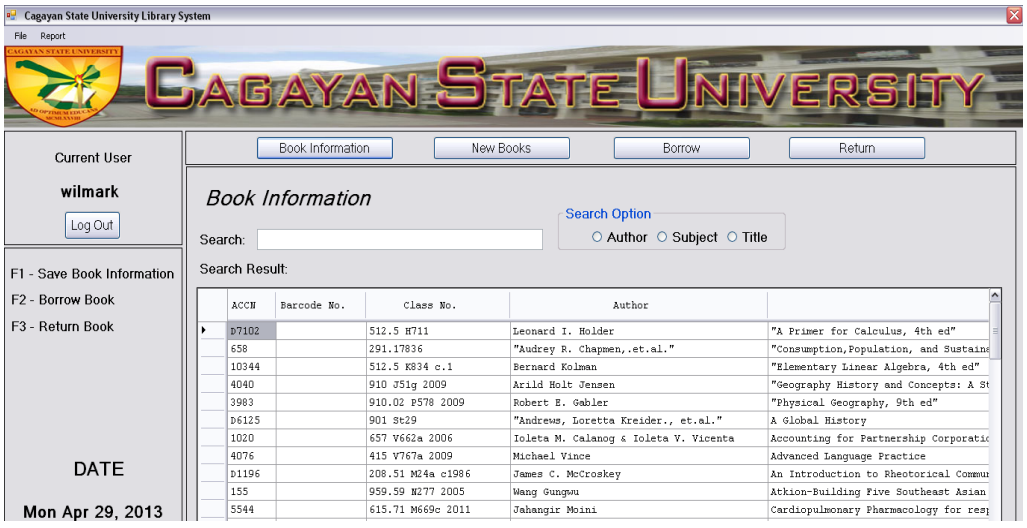


Figure 9 Book Information (Client)

Figure 9 shows the screen used by guest users who would like to know the availability of a book according to Title, Subject, or Author. This would be helpful in letting the borrower decide whether or not to come inside the library.

Figure 10 Lock Application

Figure 10 shows the Lock application screen. Lock application is the log-off mechanism of the system when the user logged-in needs to leave the post for quite some time. The main purpose is to lock the application from malicious users once, the application is locked the user will be asked to unlock his user details again. With the wrong inputted details of the current logged in admin, a message box shall appear on the screen as shown below.

How may the LMS for CSU be evaluated in terms of Security, User Interface, Accuracy of Information and Reliability of Data

Systems evaluation in terms of Security

Table2: Frequency Distribution of the Faculty as to the Security of the Proposed System

DESCRIPTION	FREQUENCY	PERCENT
Strongly Agree	65	81.25
Agree	15	18.75
Undecided	0	0
Disagree	0	0
Strongly Disagree	0	0
TOTAL	80	100.00

Table 3 Frequency Distribution of the Students as to the Security of the Proposed System

DESCRIPTION	FREQUENCY	PERCENT
Strongly Agree	337	87.08
Agree	50	12.92
Undecided	0	0
Disagree	0	0
Strongly Disagree	0	0
TOTAL	387	100.00

Table 2 shows that majority of the faculty respondents have strongly agreed that the system secures data from unauthorized users. Likewise, majority of the students have also agreed that the LMS secures the system as shown in table 3.

Figure 11 User identification

Figure 11 shows the login/ user identification windows. Users of this system are only allowed to log in three times, if logging is unsuccessful on the third attempt, the system exits and user needs to activate the system again to log in. This implies that the proposed system performs all the tasks with a minimum amount of instruction, easier to use and matching it more closely to user needs and requirements.

System evaluation in terms of user interaction

Table 4 Frequency Distribution of the Faculty as to the User Interaction the Proposed System

DESCRIPTION	FREQUENCY	PERCENT
Strongly Agree	15	18.75
Agree	65	81.25
Undecided	0	0
Disagree	0	0
Strongly Disagree	0	0
TOTAL	80	100.00

Table 5 Frequency Distribution of the Students as to the User Interaction of the Proposed System

DESCRIPTION	FREQUENCY	PERCENT
Strongly Agree	82	21.19
Agree	305	78.81
Undecided	0	0
Disagree	0	0
Strongly Disagree	0	0
TOTAL	387	100.00

Table 4 shows that majority of the faculty respondents have strongly agreed that the menu labels are appropriately chosen and arranged orderly on screen, messages on dialog boxes are clear and properly stated, font color and background color on Window screen enhances its general appeal, reports generated are properly formatted and displayed proportionately on screen and on paper. Likewise, majority of the students have also agreed that the system interface, its background its appearance is acceptable as shown in table 5.

System evaluation in terms of accuracy

Table 6 Frequency Distribution of Faculty as to the Accuracy of the Proposed System

DESCRIPTION	FREQUENCY	PERCENT
Strongly Agree	50	62.5
Agree	30	37.5
Undecided	0	0
Disagree	0	0
Strongly Disagree	0	0
TOTAL	80	100.00

Table 7 Frequency Distribution of Students to the Accuracy of the Proposed System

DESCRIPTION	FREQUENCY	PERCENT
Strongly Agree	145	31
Agree	242	62.53
Undecided	0	0
Disagree	0	0
Strongly Disagree	0	0
TOTAL	387	100.00

Table 6 shows that majority of the faculty respondents have strongly agreed that the proposed system generates desired outputs and contains required details, processes stored data and generates required reports accurately. Likewise, majority of the students have also agreed that the system is accurate as shown in table 7.

System evaluation in terms of reliability

Table 8 Frequency Distribution of Faculty as to the Reliability of the Proposed System

DESCRIPTION	FREQUENCY	PERCENT
Strongly Agree	50	62.5
Agree	30	37.5
Undecided	0	0
Disagree	0	0
Strongly Disagree	0	0
TOTAL	80	100.00

Table 9 Frequency Distribution of Student as to the Reliability of the Proposed System

DESCRIPTION	FREQUENCY	PERCENT
Strongly Agree	300	77.51
Agree	87	22.48
Undecided	0	0
Disagree	0	0
Strongly Disagree	0	0
TOTAL	387	100.00

Table 8 shows that majority of the faculty respondents have strongly agreed that the proposed system provides protection against unauthorized users. Likewise, majority of the students have also agreed that the system is reliable as shown in table 9.

Table 10 Faculty Overall Performance Level of the Proposed System

CRITERIA	MEAN	DESCRIPTION
Security	4.8125	Strongly Agree
User Interface	4.1875	Strongly Agree
Accuracy of Information	4.3746	Strongly Agree
Reliability of Data	4.625	Strongly Agree
GRAND MEAN	4.4999	STRONGLY AGREE

Table 11 Student Overall Performance Level of the Proposed System

CRITERIA	MEAN	DESCRIPTION
Security	4.8798	Strongly Agree
User Interface	4.2118	Strongly Agree
Accuracy of Information	4.3746	Strongly Agree
Reliability of Data	4.7751	Strongly Agree
GRAND MEAN	4.5603	STRONGLY AGREE

The result of the evaluation made by the respondents as to the overall performance level of the proposed system by the faculty is shown on Table 9. Likewise the result of the evaluation made by the students as to the overall performance level of the proposed system by the faculty is shown on Table 10. The grand mean of 4.5603 means that generally, the respondents strongly agree that Design and Development of Library Management System for Cagayan State University is reliable and is acceptable by the stakeholders.

Legend:

4.21 – 5.00 – (Strongly Agree)
3.41 – 4.20 – (Agree)
2.61 – 3.40 – (Undecided)
1.81 – 2.60 – (Disagree)
1.00 – 1.80 – (Strongly Disagree)

WHAT NEW FEATURES AND FUNCTIONALITIES INTEGRATED IN LMS

The following are the screenshots of the new features and functionalities integrated in LMS.

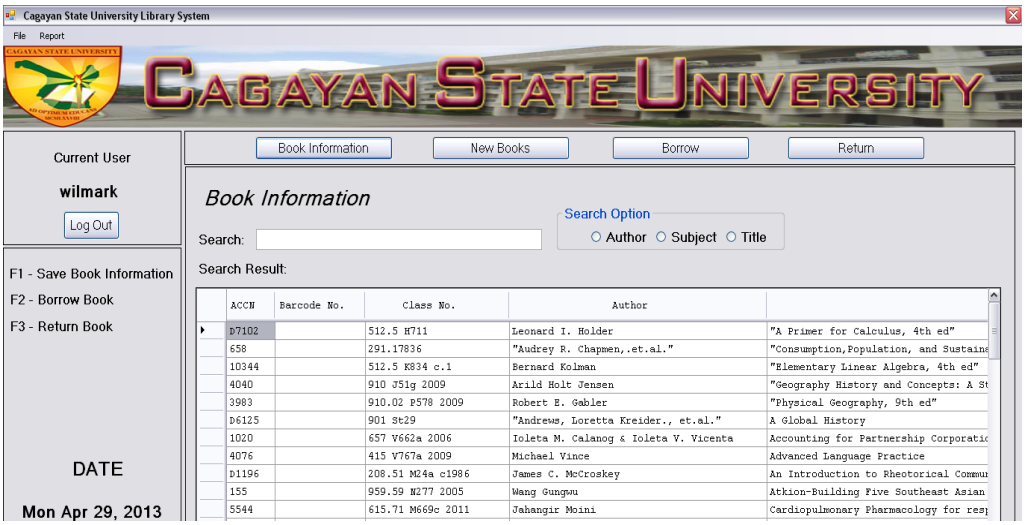


Figure 9 Book Information (Client)

Figure 9 shows the screen used by guest users who would like to know the availability of a book according to Title, Subject, or Author. This would be helpful in letting the borrower decide whether or not to come inside the library.

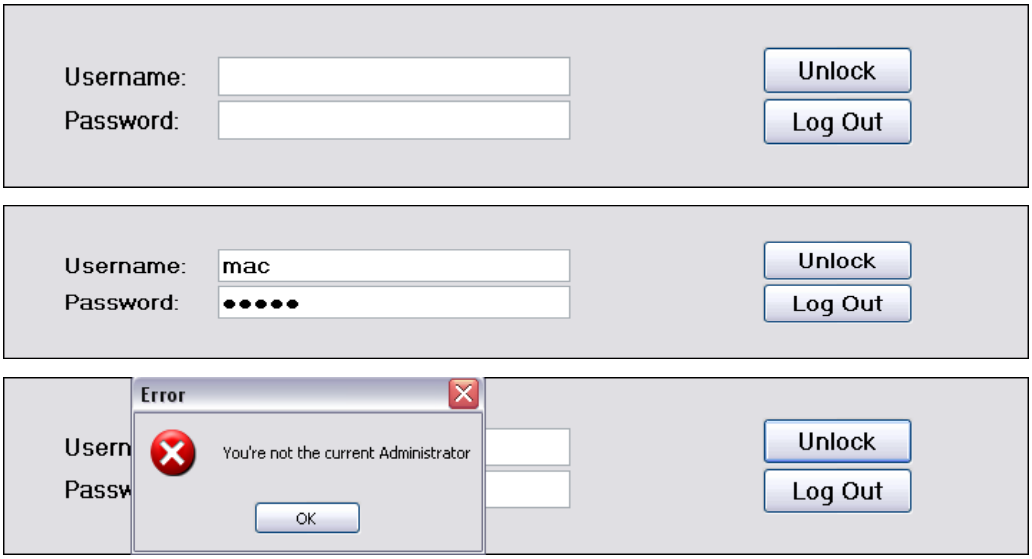


Figure 10 Lock Application

Figure 10 shows the Lock application screen. Lock application is the log-off mechanism of the system when the user logged-in needs to leave the post for quite some time. The main purpose is to lock the application from malicious users once, the application is locked the user will be asked to unlock his user details again. With the wrong inputted details of the current logged in admin, a message box shall appear on the screen as shown below.

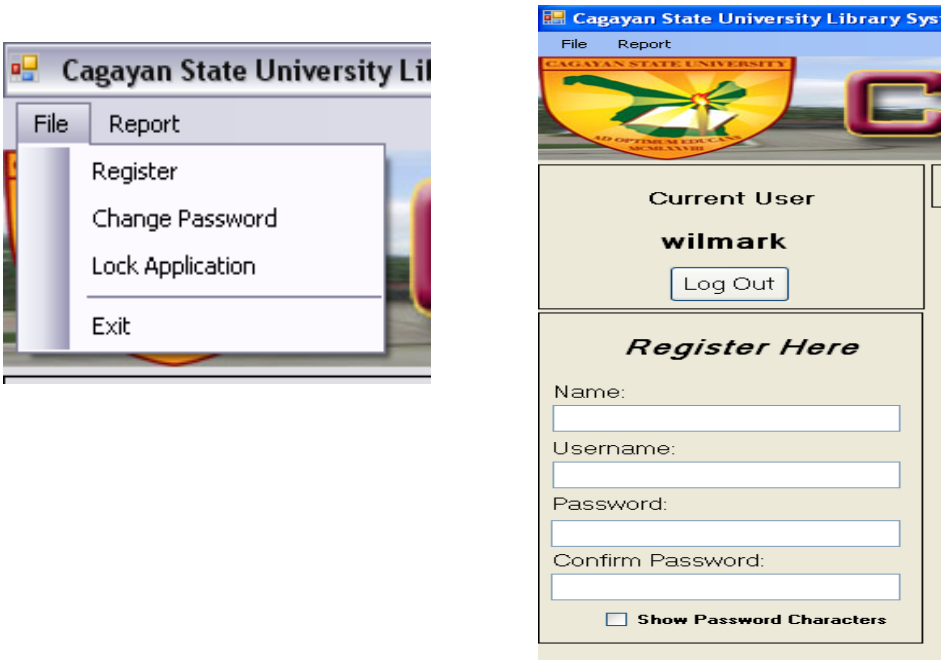


Figure 11 Register

Figure 11 shows the adding of new admin users and the register panel.

SUMMARY OF FINDINGS

In the development of the Library Management System for Cagayan State university, the following significant steps where undertaken:

1. Analysis of the current process of Library Management. Among the common problems that were identified were: Time consuming manual operations, Loss of books, Loss of documents such as borrowing slips, voluminous paper works and cataloguing.
2. Designing the proposed system. The researchers used the following tools and technique sin the development of the proposed system: Hierarchical Input-Process-Output (HIPO), Cross functional flowchart, Entity Relationship Diagram (ERD), Data Flow Diagram (DFD),
3. Implementing the Library Management of Cagayan State University, this research employed the phased strategy of implementation. The phased approach takes the conversion one step at a time.

The essential feature integrated in the LMS includes the following:

1. Book Information Menu. This is designed to provide the end user to do book query using authors, subject or book title.

2. Lock application screen. A feature by which a user can temporarily leave his/her terminal unattended without losing connection and at the same time securing the terminal from unauthorized access.

Evaluation of the Library Management System

The LMS was evaluated in terms of the of Security, User Interface, Accuracy of Information and Reliability of Data with the following findings

1. Majority of the faculty respondents have strongly agreed that the system secures data from unauthorized users thru authentications, in contrast with the majority of the student respondents who only agreed.
2. Majority of the faculty and student respondents have agreed with the following:
    a. Menu labels are appropriately chosen and arranged orderly on screen.
    b. Messages on dialog boxes are clear and properly stated.
    c. The font color and background color on Window screen which enhances its general appeal, reports generated are properly formatted and displayed proportionately on screen and on paper.
3. Majority of the faculty respondents have strongly agreed with the following:
    a. that the proposed system generates desired outputs
    b. contains required details
    c. processes stored data and generates required reports accurately. In contrast, the student respondents have only agreed to the aforementioned features of the LMS.
4. Majority of the faculty and student respondents have strongly agreed that the proposed system provides protection against unauthorized users.

CONCLUSION

1. The burden of managing the library holdings of the librarian, staff and students in the University was narrowed.
2. The usual process of borrowing and returning of books of teachers and students is slows considering the number of designated personnel performing such task.
3. The developed software is a better alternative to facilitate monitoring of books in the library.

4. The system provides a user friendly environment, easy to use and generates required academic records.
5. The system minimizes repetitive data entry activities. The data could be manipulated to generate required reports and retrieved when needed.
6. The system creates a back up copy of the data files to ensure that inputted data are not lost.
7. The system contains a complete listing of books required in the courses offered by the university. The complete list of books is used as basis in determining list of borrowed, returned, tampered and lost books for purposes of identifying different books in the library.

RECOMMENDATIONS

From the foregoing summary and conclusions, the following recommendations are made:

1. The system should be implemented in all the campuses of the university.
2. Training and workshops on how to use the system is to undertaken prior the implementation

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