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DESIGN AND IMPLEMENTATION OF ANDROID MOBILE LIBRARY MANAGEMENT SYSTEM FOR FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA

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Abstract— A mobile computerised system for handling the activities and services of the library provides a comprehensive way to lessen physical labour, reduce human error and grant access to information materials anywhere and anytime. This research work aimed to design and implement an Android Mobile Library Management System that university libraries can use to overcome the human and other challenges that prevent them from providing services on the go. The research work was guided by four objectives and four research questions. The Android Mobile Library Management System was designed and implemented using the Android studio which contains XML (extensible markup language) and Java. At the back-end HTML (Hypertext markup language), CSS (Cascading style sheet), PHP (PHP Hypertext pre-processor) and MySQL database were used. The system was tested after the development and found suitable for meeting all the requirements specified. The system has capacity to add to the integrity of the library, ease the activities of the librarian and eliminate the stress related with the current process of searching for library books.

Keywords—Library Management system; Information system; Mobile application; Android; MLMS

I. INTRODUCTION

A library is an organised collection of information resources made available to the general population or a specific niche of professionals. It usually consists of information resources in physical or digital formats. In recent times, access to information was only from physical library buildings but as innovation progressed access was extended to the web [1].

A mobile Library Management System offers a complete solution for universities and organizations to introduce and integrate specialized functions and services to its community. Mobile library management systems are tools which help the information custodian to maintain and manage library processes through the deployment of computerised system that are powerful and capable of documenting and tracking different library transactions such as loaning, accessioning, and registration of library users [2].

The proposed project aims at developing an Android mobile library management system containing materials available in the library in an organised format and help users access relevant study resources more easily and quickly while also availing them the services provided by the library electronically.

II. STATEMENT OF THE PROBLEM

Many university libraries in Nigeria have not yet been fully computerised and they continue to embrace a manual approach in handling some transactions and completion of some library tasks. It can essentially be concluded that these libraries carry out their activities utilizing paper-based documentation. Some of these library tasks include organisation of library materials for example, cataloguing, processing of books, accessioning, indexing and arrangement, circulation, etc are carried out manually which unavoidably is slow, tedious, prone to error, and information not being recorded accurately. In addition, misfiling of records occurs from time to time as attested to by operators. More so, the current computer-based systems in most libraries are static and difficult to manage on the go. It is therefore imperative that a mobile library management system is designed and implemented by the institution to uphold the management and dissemination of library resource seamlessly.

III. OBJECTIVES OF THE STUDY

The aim of this project is to develop a system that can handle and manage some of the activities involved in a library efficiently and reliably. The specific objectives are to:

- i. investigate methods that harness a mobile library management system for use by clients
- ii. develop a mobile library management application.
- iii. implement the developed mobile library management application for convenience in the selected institution.
- iv. To test the application to determine its performance

IV. REVIEW OF RELATED LITERATURE

Mobile technology in general can be seen as any technology with the readiness to move, examples of such technologies may include automobile industries, notebooks, personal digital assistant, and mobile phones. Mobile technology gadgets combine hardware, operating systems, networking and software [3].

The Library Management System (LMS) is a management software for monitoring and controlling the transactions in a library [4]. LMS is used for library resource planning, accessing the held records, requests, charges or loans all made by users. The LMS can be said to be a resource planning



system for a library, used to monitor things owned, orders made, charges settled, & benefactors who might have lent. [5].

The mobile library management system uses current awareness service and resource organisation for selective sharing of information to ease the librarians work. MLMS can be defined as a system for information resource cataloguing, utilized in accessing the documents held, orders, payment or lending conducted by the users [6].

Functions of Mobile Library Management System

In Libraries, different departments and units work together to execute pre-assigned duties. Therefore, a Mobile Library Management System (MLMS) consists of various utilities that work together to make an efficient system. The MLMS is broken into modules to ensure effective management of library tasks. They include;

- (i). Online public access catalogue (OPAC): This describes a list of the books stored on a database online and is made available to users in the library.
- (ii). Maintenance: Details about users and materials are maintained
- (iii). Records management: Records management handles the management of information of registered users.
- (iv). Storage: It allows the storing of bibliographic information of books such as author, title and subject and also acts as a database for students, lecturers and books
- (v). Bibliographic search: Here the library may define parameters on search forms. That is; search by subject, author, keywords, titles etc
- (vi). Full acquisitions: Acquisitions includes obtaining vendors orders', valuing and expense projections.
- (vii). Security: Provides security measures to deter unpermitted people from accessing the system. For example, users must sign in to their registered accounts with a password to carry out certain tasks on the database.

V RESEARCH METHODOLOGY

Structured system analysis and design (SSAD) was used in the design of the Android MLMS. SSAD is a step by step description of how the development of the android mobile library management system was carried out. The application's functionality and design were developed based on detailed investigation of the manual library system of Federal University of Technology, Minna.

Various strategies and techniques were adopted for analytical representation throughout the study. Data requirement were gathered using qualitative techniques such as observation and oral interviews were conducted to elicit responses from professional librarians working in various functional areas of the library. Data presentation was done using use case diagram and data flow analysis.

VI SYSTEM ANALYSIS AND DESIGN

Description of Existing Approach

In the current arrangement of Library Management System, library exercises, for example, the documentation of books in Federal University of Technology Minna Library has been done physically much of the time for services like borrowing of books or return of books and also searching for resource and materials. A great deal of issues come up because of the manual approach thereby creating an incapable and unproductive library administration system. The current system has caused a rise in human error subsequently leading to mishandling and loss of information resources. Nonetheless, trouble in searching for and retrieving of books which could be described as a deficiency in book management is an issue in the manual library inevitably leading to wastefulness and tediousness in the library usage. Likewise, the issue of physical space arises at the point when the amount of records ends up being tremendous, the required space for physical archive and records also rises assuming no digital system is put into place thereby also increasing cost because of absence of instant data recovery and time loss in utilizing a library.

Challenges of existing system

Some problems faced in the existing library system are:

- (i). In physical documentation, accidents such as loss of data, age and even issues of natural disasters can damage the files.
- (ii). The method of storage used poses a problem when records increase in the library causing an increase in the need for physical storage space.
- (iii). Users spend a lot of time when searching for a book that has been removed or borrowed by another user whose record cannot be retrieved on paper.
- (iv). Human errors of misfiling as the current library system is susceptible especially in its daily operation.
- (v). Processing speed of the system which is very poor eventually leading to a low output.
- (vi). Difficult with communication in the current system causing a need for routines to be created
- (vii). Data loss since constant documentation is needed for the safe guarding of information of materials borrowed to a user that is registered.



Description of Proposed system

The mobile library management system is an android based application system which is used by an administrator (Librarian) as an alternative means of record keeping of the books stored in the library. Its features are capable of ensuring that:

- (i). Users register with their admission details, first and last name, matriculation number etc. Creating a username and login password to be used for log in by the registered user including the Administrator.
- (ii). Users are allowed to log into the system with their email and generated password as registered.
- (iii). The administrator can login to view and monitor details and activities of any particular user

System Design

System design details the general system organization, menu structures, data structures and so forth. It also holds sample windows and reports. Other specialized documentation like entity diagram, data dictionary is created in this stage. The documents for system testing are readied. During this stage, the UI (user interface) is outlined and input and output is recognized. Also, inside and outside controls are designed and in addition computer based and manual features to ensure that the system will be reliable, accurate, and viable and secure are specified.

Use Case Diagram

This highlights the relationship between the user and the information system. The user represents an actor communicating with the information system [7] The use case diagram for the proposed system is shown in figure 1

Data flow diagram

This is a diagram showing the sequence and arrangement of users' actions in the LMS.

System Database Schema

app_author(authorID:int,authorName:vchar,authorStatus:tinyint,createdBy:int,dateAdded:Datetime,dateModified:Datetime,isActive:tinyint)

app_book(bookID:int,categoryID:int,authorID:int,bookTitle:vchar,bookCover:vchar,bookStatus:tinyint,createdBy:int,dateAdded:Datetime,dateModified:Datetime,isActive:tinyint)

app_subject_category(categoryID:int,categoryName:vchar,categoryStatus:tinyint,createdBy:int,dateAdded:Datetime,dateModified:Datetime,isActive:tinyint)

app_course(courseID:int,departmentID:int,levelID:int,courseName:vchar,courseStatus:tinyint,createdBy:int,dateAdded:Datetime,dateModified:Datetime,isActive:int)

app_department(departmentID:int,facultyID:int,departmentName:vchar,departmentStatus:tinyint,createdBy:int,dateAdded:Datetime,dateModified:Datetime,isActive:int)

app_user_access(accessID:int,accessName:vchar,accessStatus:tinyint,dateAdded:Datetime,dateModified:Datetime,isActive:int)

app_user(userID:int,accessID:int,departmentID:int,userName:vchar,userPass:vchar,userFname:vchar,userLname:vchar,userEmail:vchar,userMobile:vchar,userMatricNum:vchar,userLevel:int,userImage:vchar,userStatus:tinyint,dateAdded:Datetime,dateModified:Datetime,isActive:int)

Application Description

Sign up

New users are expected to sign up using the “sign up” button first before they can access the application. Series of information are requested of the user and the user should provide such details.

Login

Users are expected to enter their login details such as “email and password” to access the application. The user must provide his/her accurate details or he will be required to create a new account before being granted access.

Main Menu/ Home Page

This is the initial page displayed after a user successfully logs in; it contains the dashboard, browse, search and my library tabs from which a user can select their preferred option.

Dashboard

The dashboard option shows the recommended books and the new releases of materials when selected.

Browse

This contains the list of materials on the library, showing different subject which the books are categorized into.

Search.

This option assists the user to search for materials using specific keywords such as the author's name, title or subject of the required book.

My library

The browse tab shows the books that are saved by the user and the profile of the user. The user can edit



some of his information on the profile tab and there is a logout button to log all users out

SYSTEM IMPLEMENTATION AND TESTING

System requirements

The proposed Android application was designed using web 2.0 technologies including: android studio, JAVA, XML, JSON, and MySQL.

Hardware requirements

A Mobile device or Tablet with the following requirements is recommended:

- (i). Android Operating system, a minimum of version 2.3 is required.
- (ii). A minimum of 1Gb RAM is required as it provides fast reading and writing capabilities and will in turn support the processing.
- (iii). An internal space or memory of 50Gb is required

Software requirements

Software is a set of instruction that tells the computer what to do. For effective functionality of the android management system the android operating system version 4 or above was used.

(a)Software tools used for the application

The entire project is divided in two parts the front end and the back end. On the frontend of the application, XML was used to depict the optional data structures such as those used as piece for web organisation. On the other hand, Java was used to develop the back-end of the application while SQLite was deployed as the database engine.

Furthermore, the admin front-end was deployed using HTML, CSS and JavaScript while the back-end was implemented using MySQL and PHP.

System testing

Each module was tested separately and thereafter tested as a system. Test results confirmed that both functional and non-functional requirements were met. Pilot testing was done with a group of users

before its full deployment with a specific end goal to give input on its execution or performance.

The domain was registered by Namecheap as silaskolo.me/elibrary. Namecheap is an ICANN (Internet Corporation for Assigning Name and Number) accredited Registrar. The Server was hosted by “digitalocean” which is a cloud infrastructural provider, a username and password was created and a free storage of 20gigabyte for 9 months was offered.

The administrator enters the domain name or URL: <http://silaskolo.me/elibrary> on his browser and the administrator’s login page is displayed, the administrator provides his email and password and the home page is displayed showing the categories, users, faculties, department and books where he can upload, edit, delete, view books and other information.

RESULT FROM TESTING

Result for the administrator

The administrator entered the URL: <http://silaskolo.me/elibrary>

The administrator was able to login successfully

The administrator was able to upload books successfully

The administrator was able to input the categories of materials.

The administrator was able to input departments and faculties of users.

The administrator was able to edit and view the information of the books uploaded.

Result for the users

Users were able to open the application, signup and login successfully

Users were able to view the books uploaded by the administrator

Users were able to read the materials on the application



Users were able to add books to their libraries

Users were able to search for materials by keywords

Users were able to edit their profiles

Users were able to logout successfully

VII SUMMARY, RECOMMENDATIONS AND CONCLUSION

Summary

There is a developing impact of mobile technology in libraries; mobile applications have seen mainstream use in teaching, learning, and research. Computer innovation has changed such a significant number of parts particularly the Educational division in no little measure. With an end goal to cultivate innovation driven education, a Mobile Library Management System has been produced with Android to deal with all library operations, for example, arrangement of materials, dissemination to it user, quick and easy access, reference and so on.

Conclusion

In conclusion, from legitimate examination and assessment of the designed system it can be securely inferred that the mobile application system is an effective, usable and dependable Mobile Library Management System. It is working appropriately and sufficiently meets the minimum requirement that were set for it at first. The new system is required to offer easy accessibility, better or faster information retrieval to the clients and as far as productivity is concerned. The utilization of library system can be guaranteed.

Recommendations.

Having Mobile Library Management System in a university's library is good. This makes the tasks of the library staff easier, stress-free for the users. We therefore recommend the following;

- 1) The mobile library management system with all essential hardware requirements for implementation of the mobile library management system should be put to ideal use.
- 2) For further research on mobile library management system, a platform for chatting with the reference librarian at any point or anywhere should be considered.
- 3) Librarians should be trained as administrators of the system
- 4) Librarians should be able to maintain and update the system continually.

- 5) A means should be provided for awareness and enlightenment of the application for effective and efficient use.

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REFERENCES

- [1] R. Dinesh, S. Pravin, M. Aravindhan and D. Rajeswari, "Library access system smartphone application using android," *International Journal of Computer Science and Mobile Computing*, vol. 4, no. 3, pp. 142-149, 2015.
- [2] V. Singh, K. Prabhakar, R. Kumar and R. Singh, "Library Management System," Cochin University of Science and Technology, Cochin, 2014..
- [3] S. Nalluri and B. Gaddam, "Mobile library services and technologies," *International Journal of Research in Library Science*, vol. 2, no. 2, pp. 59-66, 2016.
- [4] A. Tripathi and A. Srivastava, "Online library management system," *Journal of Online Library Management*, vol. 2, no. 2, pp. 1-25, 2011.
- [5] E. Uzomba, J. Oluwatofunmi and C. Anthony, "The use and application of open source integrated library system in academic libraries in Nigeria: Koha example," *Library Philosophy and Practice (E-Journal)*, vol. 37, no. 1, p. 1250, 2015
- [6] I. Enache, "Aspects regarding library management systems," LISR Bucharest, 13 March 2012. [Online]. Available: www.lisr.ro/en16-enache.pdf. [Accessed 4 April 2017].
- [7] B. Soedino, "System Analysis and Design," *Journal of Chemical Information and Modelling*, vol. 53, no. 1, pp. 10-22, 2012.

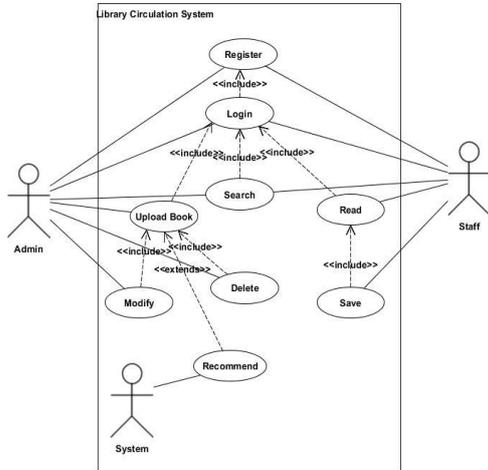


Figure 1 Use Case Diagram of the MLMS

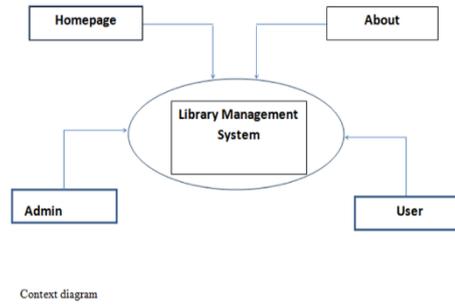


Figure 2: Context diagram of the MLMS

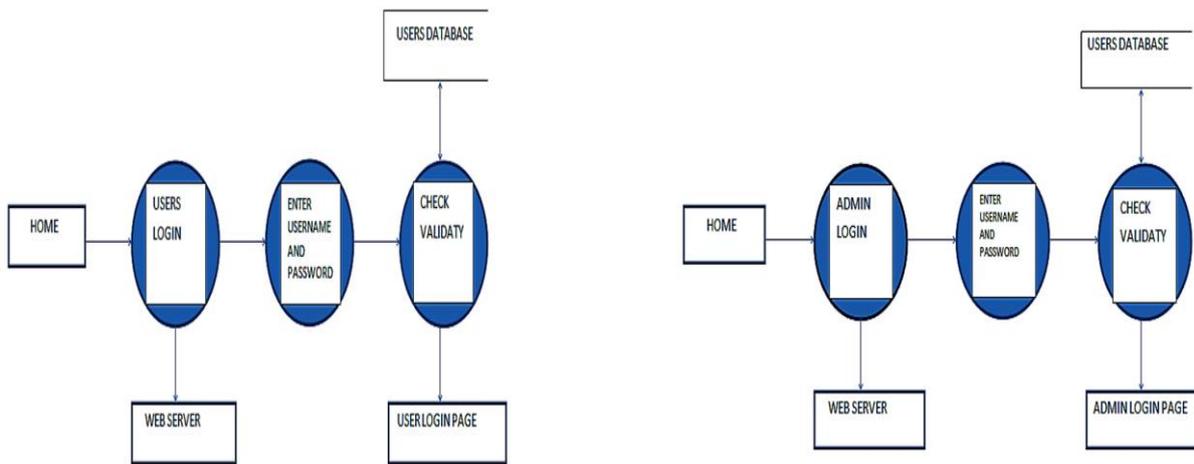


Figure 3: Data flow diagrams for showing (a) user login and (b) admin login



Fig. 4: Startup page

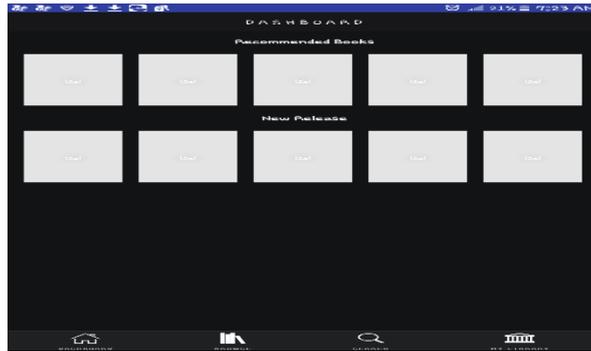


Figure 5: Application Dashboard

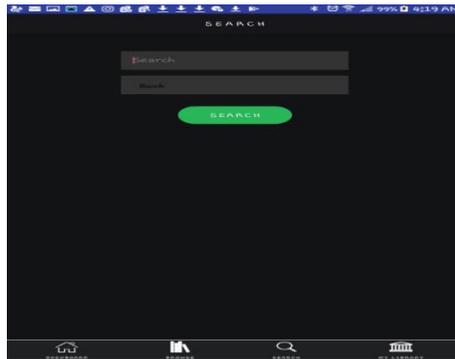


Figure 6: Search Interface

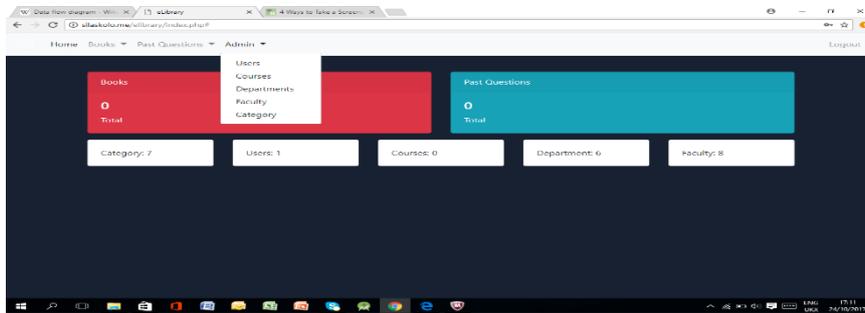


Figure 7: Admin Home Page

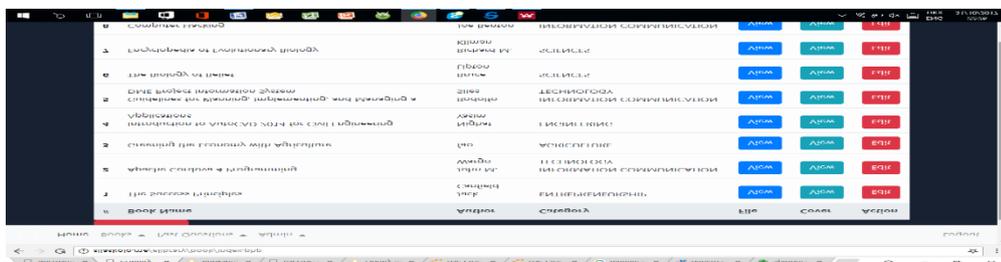


Figure 8: Admin Books upload pag