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Building and Development of Cloud Computing Services for Library Management System and Institutional Repository in University Libraries in Nigeria

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ABSTRACT
Library management system software's (LMS Koha) and Institutional repositories (IR Dspace) are one of the fastest growing mediums of accessing digital information resources in Academic Libraries today, considering their potential in intellectual out visibility and accessibility online in remote location, feature open access with flexibility to run, build, design, distribute and redesign to a specific need of the University library, they are on cloud service avoiding the risk of losing once data/file or thinking of minimizing space. Naturally libraries without much financial resources need a less cost effective way to automate their services. Free/Open source software are revolutionary concept among computer programmers and users. To a certain extent free/open source solutions could provide an alternative solution to costly commercial application software's. This study is to building and development cloud computing service for library management system and institutional repository in the University libraries in Nigeria and have successfully built and develop LibLimekoha and Dspace institutional repository.

Keyword: Open access software's, Cloud computing services, Digitization

I. INTRODUCTION

The growing roles oftechnological innovation and advancementin organizational learning arevery widewith unprecedented benefits,to a situationwhere it's nearly impossible formost libraries to keeppace with the rapid evolution ofthese tools, even as today's technologyexperts discuss artificial intelligence andimmersive virtual worlds, (Neethu and Vanaja, 2017). In which Nigerian University Libraries are not exceptional, still wrestlingwith how best to leverage on digitizing their collection and use cloud computing service for it efficient and effective library service delivery.

Cloud computingprovide a broad set services on virtual servers available to a collection of information resources or digital text to a library for the clientele, of which can be access inany device, that supports the web application, the data or information can be access on remotely or on local server (Serials &Sakib, 2019). Cloud computing provide enabling service to store and manage digital library collection and the digitize collection through Library management software and institutional repository.

Library management software works with web service in providing various digital library functionality including creation, organization, maintenance, indexing, search and retrieval of data or informationwhile an institutional repository use to capture and preserve and provide access to the institutional digital collection or intellectual output of a single or multi-university community in a data base (Kevin M. Handeli and Stefan Robila 2018). Libraries are using cloud computing technology for putting together library resources, to store and make the store information resource accessible to users that is, by using software as a Service (SaaS) as in the use of Green Stone,LiblimeKoha and Dspace.,(Mavodza 2020)

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LiblimeKoha and Dspace are the software of choice for academic libraries and information centres, non-profit and commercial, for organizations or institution to design, redesign, built, and develop open digital library and repositories. They are open and easy to develop "out of the box" to fit the needs of any organization or institution. LibLimekoha and Dspace software, preserves and enables library functionality, easy and open access to all types of digital or electronic content including text, images, moving images, mpegs and data sets, with an ever-growing and improvement focus on web accessibility.

This paper focuses on the building and development of liblimekoha library management software and dspace institutional repository software in Federal University BirninKebbi Library

Objectives of the study

Specifically the study is designed to:

1. Building library management software LibLimekoha and Dspace institutional repository software in Federal University BirninkebbiLibrary(FUBKL),linking Federal University Zuru Library (FUAZL) and Kebbi State University of Science and Technology AlieroLibrary (KSUSTAL),Kebbi State.
2. Assess the maturity level of electronic data or digitized data, managing the activities, avoiding cost of manual library operation in Federal University BirninKebbi Library, Federal University Zuru Library and Kebbi State University of Science and Technology Aliero Library.
3. Provide cooperation within the library and avoiding act of a single entry and retrieval point to scholarly work of the institutions.
4. Provide wider accessibility, visibility and distribution of the scholarly work of the institutions.

II. LITERATURE REVIEW

The literature of library management system and Institutional repository are increase with needs of services a University offers to the members of its community, in management and dissemination of digital materials created or digitized by the institution, in facilitation of the process a digitization procedure need to be consider. Michael ChinweikeChigbundu et-al (2022) conduct a research on Library digitization value and challenge. The article reveal that digitization plays vital roles in libraries. It help in preserving library information materials, enhancing wider access to library collection, promoting global visibility of the parent's institution, reduce cost of purchasing hard copy collection and maintaininga small space while using cloud service.Neethu and Vanaja, (2017), studied concept and applications of cloud computing in libraries. The findings revealed that libraries are moving to cloud computing technology in present time, taking advantages of cloud based services especially in promoting and delivering of their service through cloud open access software (LibLimekoha, Dspace software and others). Thus open access software are available online and can be build, redesigned and distributed with less cost, (Rosa and Lamas, 2007).

The studied implementing a library management software LibLimekoha and Dspace institutional repository as a tools to capture intellectual work and knowledge sharing at Federal UniversityBirninKebbiLibrary and enable library cooperation between the University Library, Federal University ZuruLibrary and Kebbi State University of Science and TechnologyAliero Library

III. METHODOLOGY

The methodology involves the following steps:

1. Developing and installing LibLimeKoha and Dspace software,
2. Customization and implementing the LibLiime Koha and DspaceIR.
3. Guide to digitization of library hard copy material

Library management software LMS and Institutional Repository IR Equipment and Facilities

Hardware

There are many hardwareused for image capture within the libraries. The tools ranges from scanners to high digital cameras,but the projects tend to choose from the available brand, or the one that is affordable on limited funding. (A Dhanabalan and R.Ponnudurai, 2012)

Software

Text capture or scanning software are application software use by scanning hardware to convert hard copy image or text to digital form, There are a wide variety of text scanning software's available, all with varying capabilities. The primary consideration with any text scanning software is how well it works with the condition of the text to scan for example Optical Character Recognition (OCR).

The best method of digitizing text is with optical character recognition (OCR), this process is

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accomplished through the utilization of scanning hardware in conjunction with text scanning software. OCR takes a scanned image of a page and converts it into text, most especially, text scanning, image capture has more complex requirements in terms of project decisions and, like almost everything in the digitization project. (Morrison, et al. 2018).

Usually, files are supposed to be scan converted from one format to another for example. Documents can be typically stored as Tagged Image File Format (TIFF) or Joint Photographic Experts Group (JPEG), Portable Document Format (PDF) and Portable Document Format for archiving (PDF/A), considering the files formats supported by open source directory or software.

Open source software are provided with ability to run, redesign, distribute, customize and improve for any purpose. Open source library software's does not need the initial cost of commercial software and enables libraries to have greater control over their work while using cloud environment. (Milind B. Anasane2018). The software include koha LMS and Dspace IR

What is LibLimekoha and Dspace IR?

LibLimekoha LMS

LibLimekoha is a web-based Integrated Library Management System an advanced open-source for library operation.In keeping with open source tradition, library-sponsored enhancements to LibLimeKoha are available for others to use, modify, and redistribute. It encompasses feature of library routing from cataloguing to circulation with OPAC(Milind B. Anasane 2018)

Dspace IR.

Dspace IR is digital system and repository initially,jointly developed by MIT Libraries and Hewlett-Packard designed to capture, store, index, preserve, and redistribute the intellectual research output of a University in digital format, it's an open source code to develop and customize to the need or modified to organisation specific need, the system can house wide variety of digital materials such books, theses, and 3D digital scans of objects, photographs film, video, and others. (Anene, IfeanyiAdindu, et al., 2020)

LibLimekoha and Dspace IR are advance online locus for collecting, preserving, and disseminating information in digital form for the intellectual output of an institution. The software may contain work of which the author or institution owns copyright, or for which permission has been obtained to include a copy of the work in the library or repository.

Importance of library management software and institutional repository (LibLimekoha LMS and Dspace IR) to University Library is increasing because of the need for the academic libraries to store and make available intellectual output of their lecturers and student for long archival and accessibility and also due to their availability as open source software platforms that allow simple implementations with less cost. (MdRazibKarno et al 2021, Emmanuel ChidiadiOnwubiko, 2020)

Development and Customization of our Liblimekoha LMS and Dspace IR

For the Liblimekoha LMS require server,runs on Ubuntu 24.04 LTS Operating system using the following command in the Terminal

1. sudosu
2. apt-get update
3. apt-get upgrade
4. apt-get install leafpad
5. sudo apt install mariadb-server mariadb-client –y
6. sudomysql_secure_installation
7. sudo echo deb http://debian.koha-community.org/koha oldstable main | sudo tee /etc/apt/sources.list.d/koha.list
8. sudowget -O- http://debian.koha-community.org/koha/gpg.asc | sudo apt-key add –
9. sudo apt install koha-common –y
10. sudogedit /etc/koha/koha-sites.conf
11. sudo a2enmod rewrite cgi&&sudosystemctl restart apache2
12. sudokoha-create --create-db library
13. sudogedit /etc/apache2/ports.conf
14. sudo a2dissite 000-default &&sudo a2enmod deflate &&sudo a2ensite library
15. sudosystemctl restart apache2
16. sudo apt install liblocale-codes-perl
17. sudoxmlstarletsel -t -v 'yazgfs/config/pass' /etc/koha/sites/library/koha-conf.xml;echo
18. sudosystemctl restart memcached
19. sudokoha-plack --enable library &&sudokoha-plack --start library. Or can be downloaded at (https://github.com/liblime/LibLime-Koha/blob/4_18/INSTALL)

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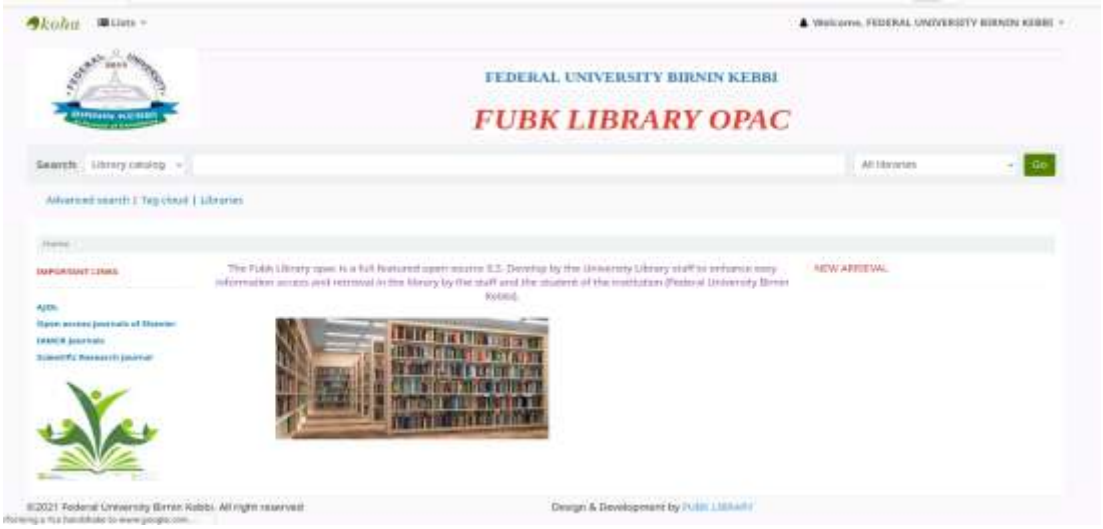
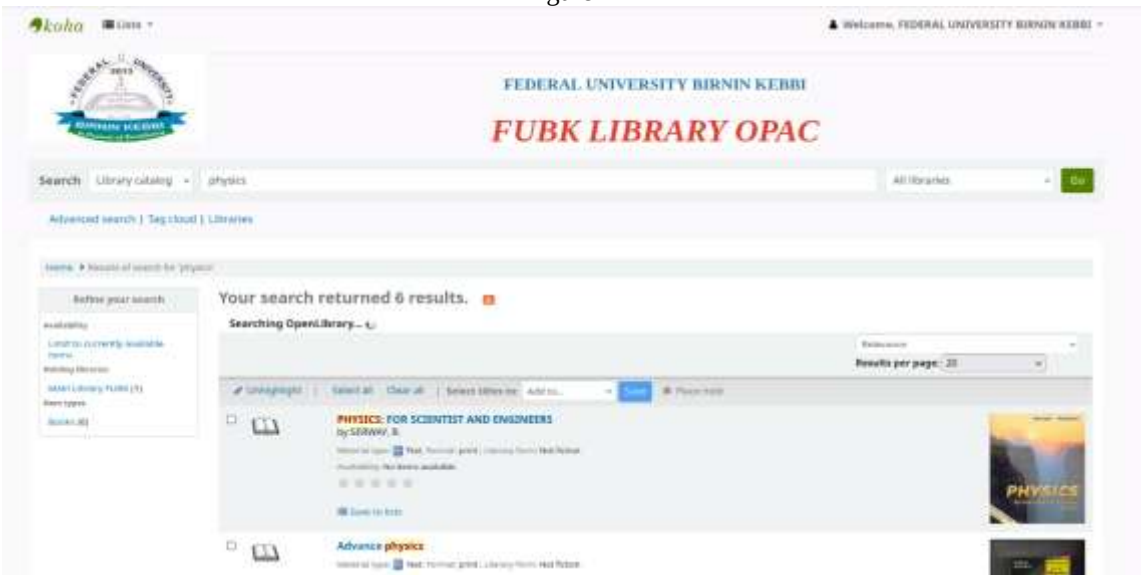
Figure 1



The online public access catalogue (OPAC) page of the LibLimekoha in the Federal University BirninKebbi Library

Figure 2



A view of searching the content in the koha OPAC

The Dspace IR runs on Ubuntu 24.04 LTS,requires on a server and withthe following installation of softwarebelow

1. Java JDK
2. Apache Maven
3. Apache Ant
4. Apache Tomcat
5. PostgreSQL
6. Solr
7. Dspace 8 – backend
8. Dspace-angular 8 – frontend
9. Node.js
10. Node Version Manager (NVM)
11. Yarn
12. gedit (text editor software) and the above software and installation package, can be downloaded in (www.sourceforge.net/projects/dspace)

Customizing the Web interface requires either the JSPUI (JavaServer Pages userinterface) or XMLUI (Extensible Markup Language user interface). The DSpace IR software is open and can be freely develop or built

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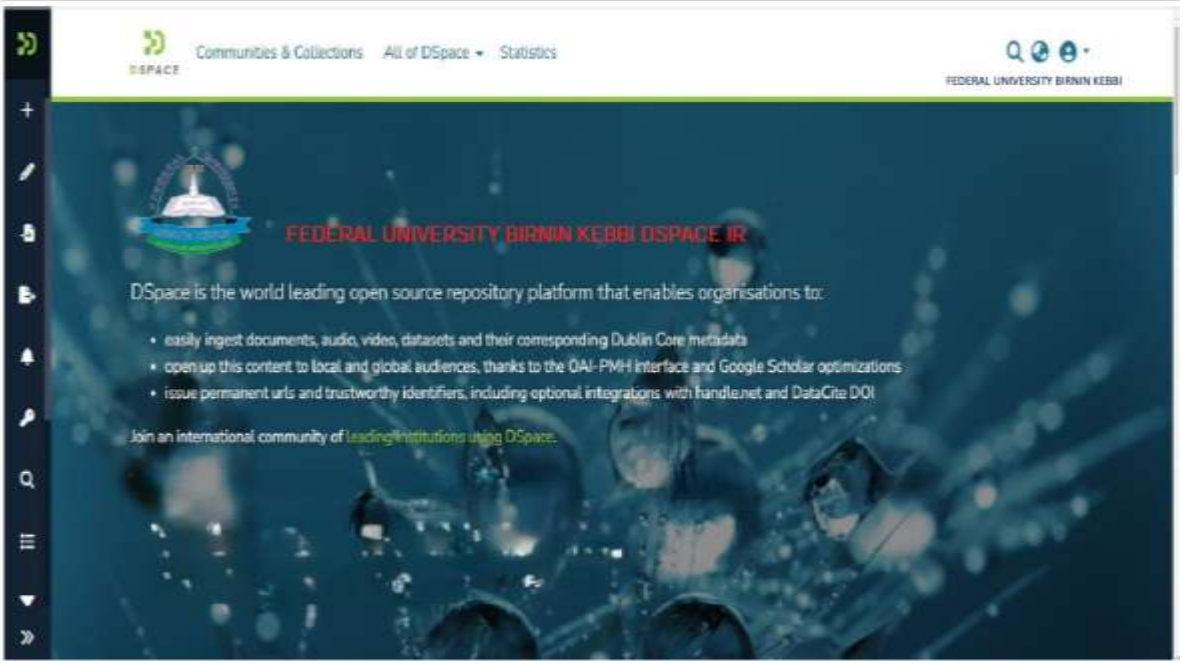
Figure 3



The face of our Dspace IR in Federal University BirninKebbi Library

Dspace IR Metadata

DSpace IR uses a Dublin qualified Core standard metadata for describing items intellectually (specifically,theLibraries working group application profile). Only three fields are required: title, language, and submission date, all other fields are optional such as additional fields for document abstracts, keywords, rights and technical metadata, (CajetanOkechukwuOnyeneke, 2023)

The metadata displayed record item in repository and indexed for browsing and searching the system within a collection in the community or communities (Fubk Library, FUZ Library and KSUSTA Library) across collections, or across Communities.

Figure 4

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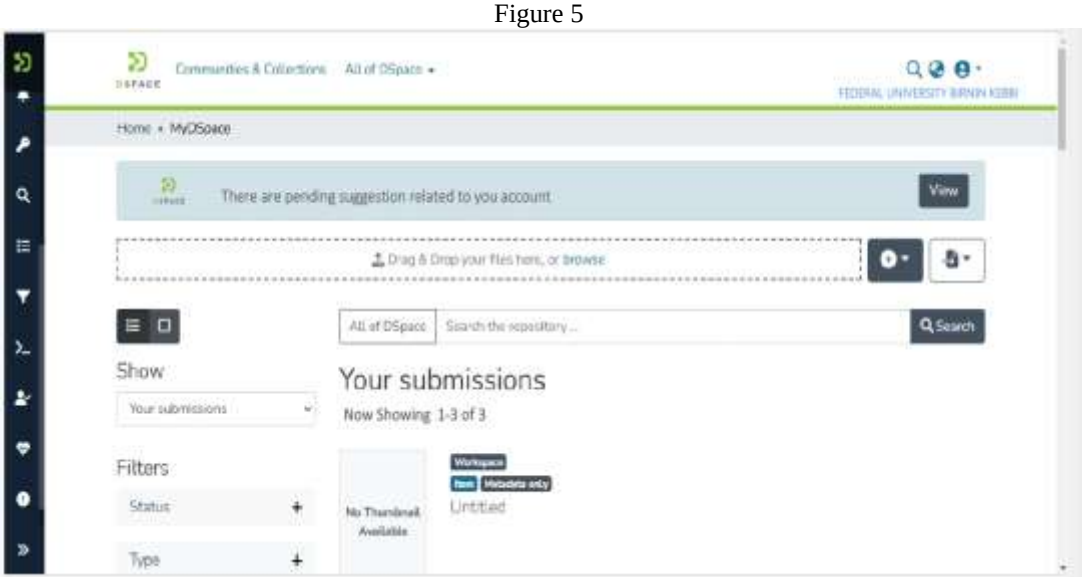
The communities in the Dspace in Federal University BirninKebbi

Figure 5



The face of work station submitting content to the Dspace IR

IV. CONCLUSION

The Federal University BirninKebbi library has successfully developed Library management software LMS and Institutional repository IR using the LibLimekoha and DSpace software and this model has been tested and its work perfectly and could be replicated in all the Faculties within and outside the University. The software significantly, extend the role of a library in providing access to it intellectual content to the communities. And it is very clear that the software's are flexible and easy to use secure and protected using cloud computing, it's a welcome development to store and to provide access to intellectual work of the University every time without restriction reduce the traditional library work burden moving to digital online. The digitize material has been assess and were used to test the workability of the software's

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