Adopting Open Source Software for Integrated Library System and Digital Library Automation

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Abstract
The purpose of this paper is to analyze the various features and functions of open source software for integrated library management system (ILMS) and digital library system. The explosion of the World Wide Web, dynamic nature of information technologies, like open source; and with escalation of electronics resources showed the way of Automated Library System (ALS). These changes are replicated in the conceptual differences between the ALS and the Integrated Library System (ILS). The ALS is acknowledged as simply a database to house and retrieve a library's holdings while ILS is acknowledged as robust clusters of systems including every process and module linked to library processes. This article presents an aspect on the evolving features of some commonly adopted Open-Source ILS Software (Koha, NewGenLib, and Evergreen) which had encouraged ALS to ILS, as well as justifications and barriers to the use of open source. Open source library management software is a solution to reducing that cost. The research describes in brief about the feature of some of the open source digital library software like Greenstone, DSpace E-Prints and integrated library software Koha NewGenlib. Evergreen ILS etc., which are useful for developing ILS and institutional repositories software in academic libraries. Free and Open Source Software (FOSS) is offered as a balancing solution to meet librarians' objectives without giving up excellence. The endeavor of this research is to confirm not only the most used FOSS in libraries but also those alternatives which are not as healthy-looking known but with great possible for the community.

Keywords: *Free Open Source Software (FOSS), Open source library management software, DSpace, Koha, E-Prints, New Genlib, Evergreen ILS, Greenstone*

1. Introduction

The explosion of convenience of information on the Internet requires that libraries develop into value-added information providers, rather than mere curators of collections. Modern libraries need to stay relevant to a diverse, technologically savvy patron base and to facilitate and add value to the research community, while facing significant resource constraints. To face these challenges, libraries need to embrace digital technologies and library management systems (LMS) in order to work smart and achieve more with less. While LMS systems have been around for decades, libraries can explore the new frontier by embracing open source solutions, like open source software (OSS) library systems, which are free to acquire. They need to collaborate with computer experts and become technologically savvy to harness the full power of OSS solutions to meet the specific needs of the library and patron base. Open source software is software that users have the ability to run, distribute, study and modify for any purpose. Open source is a collaborative software-development method that harnesses the power of peer review and transparency of process to develop code that is freely accessible. This research provides an overview of the availability, benefits, and advantages and disadvantages of KOHA and Dspace along with another open source software utilized for integrated library and digital library. The
key functions of the library, which may be automated are acquisition, cataloguing, circulation, serials control, and reference service. There is many commercial library software are in use in the different libraries, but open source library management software has generated lot of interest among the library professionals over the past years.

2. Integrated Library Management (ILS) System

Integrated library management system is a system where all tracks of a library operation such as items, bills paid, and also patron's record is kept. By this software we can operate all the library operations easily. In integrated library system there are two interfaces, one is patron and the other one is for library staff. In library system the operation of a

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user/member/patron and staff of library is different. A user can search a book, view book list which are available in library, can issue book, renew book, can hold book, can print issue list, can edit his/her information (patron information). But a staff can store bibliographic (book, CD, DVD, journal ere) records actually, library materials can be documented in database, can make patron in database, order a book and purchase a book. Acquisition, cataloguing, some functions under serial control and management are all worked by staff members of a library. In the last few years we have seen the progress of a number of ILMS products in the open source world. One important trend in these products is the use of web ~based client/server architecture. Koha and Evergreen ILMS are the most popular Open Source Software. On the other hand, Newgenlib is the only homegrown Open Source Software in this field. But Koha is more popular than others. Some of the open source software and overview of integrated library software (ILS) are shown in table 1.

2.1. Koha

Koha is a promising full featured open source integrated library system (ILS) created in 1999 by Katipo Communications for the Horowhenua Library Trust in New Zealand, and currently being used by thousands of libraries all over the world. It includes modules for circulation, cataloging, acquisitions, serials, reserves, patron management, branch relationships, and more. Koha has web-based Interfaces. Koha is built using library ILS standards and uses the OPAC (online public access catalog) interface. In addition, Koha has no vendor-lock in, so libraries can receive technical support from any party from they want. It is distributed under the free open source general public license (GPL). It supports MARC 21 and UNIMARC support, Z39.50. It also has a provision for online reservations and renewals. Figure 1 shows the live features of Koha.

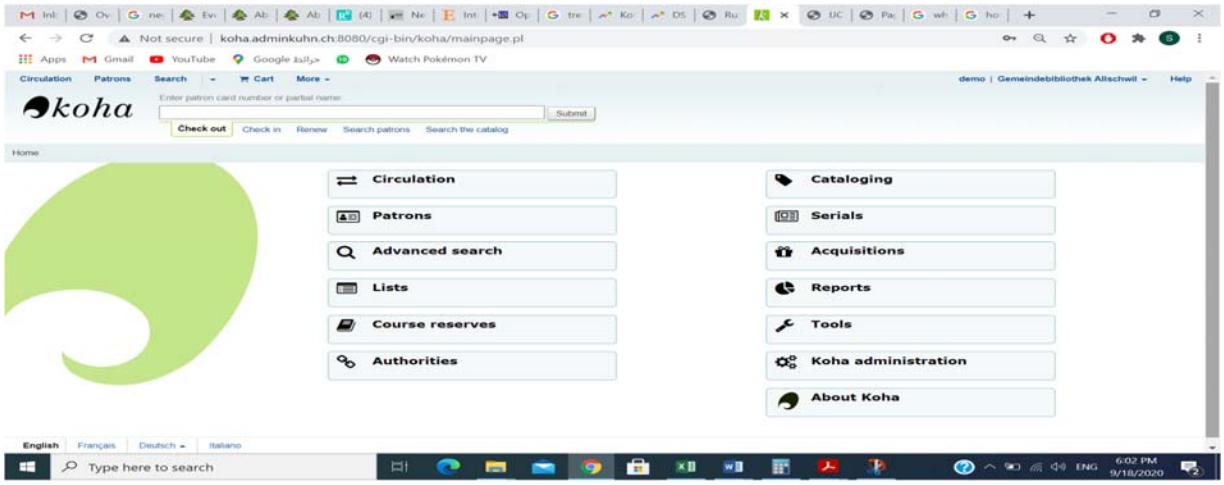

Fig. 1 List of features in Koha

2.2. NewGenlib

NewGenLib, an integrated LMS is open source under the most widely used free software license, GNU GPL. NewGenLib is the result of collaboration between specialists in library automation and software specialists. The software was developed over a four-year joint effort between a professional charitable trust, Kesavan Institute of Information and Knowledge Management (KIIKM) and a fledgling software development company. Libraries in India still do not generally use international metadata and interoperability standards (e.g., MARC-2l, Dublin Core, OAI-PMH) and it is believed that this puts them at a great disadvantage when it comes to sharing metadata and building union catalogues and networking. The fact that libraries are not networked and hence are handicapped in sharing costly bibliographic and full-text resources among themselves, the importance of providing a software that would allow both library management and the creation of institutional open access repositories increases.

2.3. Evergreen ILS

The Evergreen Project was initiated by the Georgia Public Library System in 2006 to serve their need for a scalable catalog shared by (as of now) more than 275 public libraries in the state of Georgia. After Evergreen was released, it has since been adopted by a number of library associations in the US and Canada as well as several individual libraries, and has

started being adopted by libraries outside of North America. The Evergreen development community is still growing, with about eleven active committers and roughly 20 individuals who have contributed patches (as of April, 2020). However, the Evergreen community is also marked by a high degree of participation by the librarians who use the software and contribute documentation, bug reports, and organizational energy. As such, Evergreen is very much about both the developers *and* the users.

Table 1: Features of some popular open source ILMS (Koha, Newgenlib and Evergreen ILS)

	Koha	NewgenLib	Evergreen ILS
Ownership	Horowhenua Library Trust	KIIMP & Virus Solution	Georgia Public Library Service
Latest Release	20.05	3.2 January, 2020	3.4 / October 2, 2019
License	GNU General Public License v3	(GNU GPL) version 3	GNU GPLv2
Server O/S	Linux	Win/Lin	Linux
Client O/S	Any	Any	Any
Web Server	Apache	JBoss	Apache
RDBMS	MySql	PostgreSQL	PostgreSQL
Architecture	Web Based	Client/Server Web; OPAC is web based	Web based
Language	Perl	Java	C, Perl, XUL and JS
Standard Supported	MARC 21 (Full), OAI-MARC Z39.50, PMH, NCIP	MARC 2 I(Partial), PMH, Z39.50, NCIP MARC-XML OAI- ZW.50, Unicode	MARC 21(Partial), SIP2, O PMH, Z'9.50,
Digital Content Attachment	Yes	Yes	Yes
Web 2.0 Feature	Yes	No	No
Data Migration	Yes	Yes	Yes
URL	https://koha-community.org/	http://www.verussolutions.biz/web/	https://evergreen-ils.org/

3. The Scientific Viewpoint ILS Comparison (Google Trends):

Google Trends is a website by Google that analyzes the popularity of top search queries in Google Search across various regions and languages. The website uses graphs to compare the search volume of over a given period of time. Trending searches are popular topics in your area that change during the day and aren't related to your search history. To get current trending searches, go to Google Trends. We checked the trends for last five years for this three-open source software and found that Koha is most popular open source software used for integrated libraries and trends of popularity is shown in figure 2. The features overview are compared for Koha, Newgenlib and Evergreen in table 1

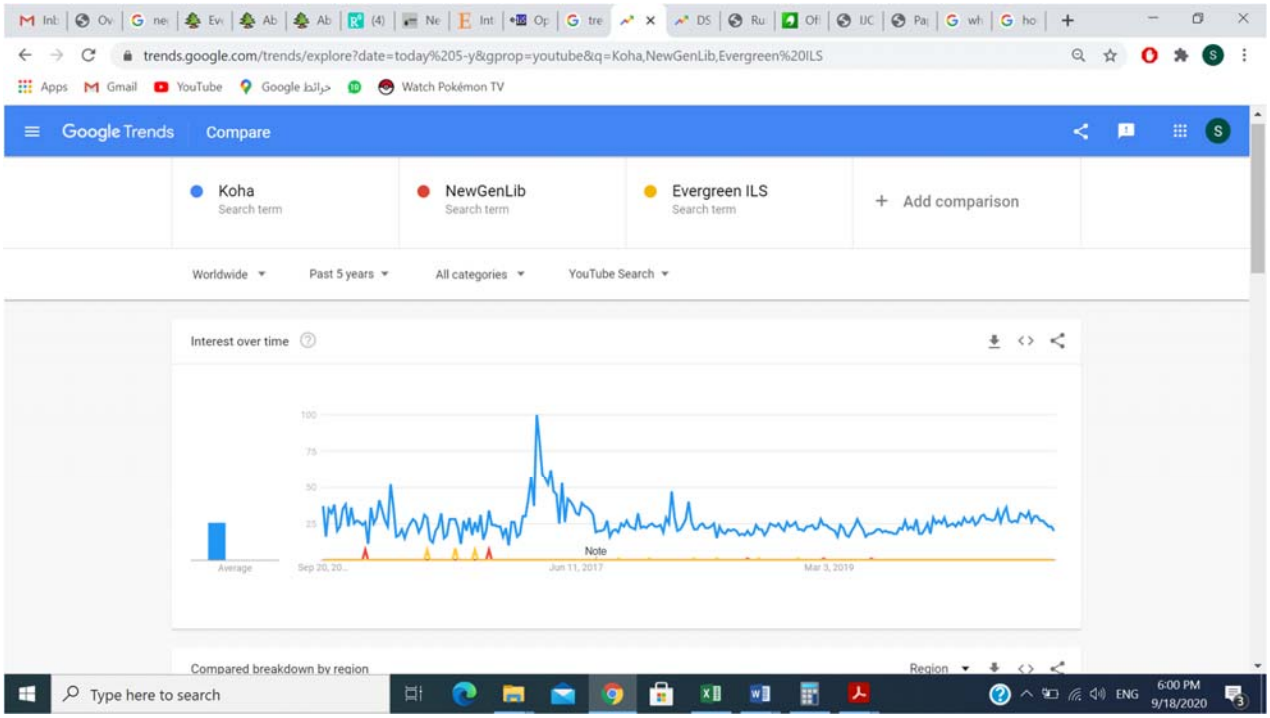

Fig. 2 Search Volume Index for the Data Provided by Google Trends Corresponding to the Koha, Newgenlib and evergreen ILS Search Terms

4. Digital Library Software

The creation and maintenance of digital libraries is vital with the growing amount of information available in the digital format, building digital libraries needs a fair amount of knowledge of information management tools such as databases, web technology, information retrieval, user interface, ete. The usability of hosted resources is as important as the quality of information presented. There are a number of Open Source Software packages for use .in building digital libraries and institution repositories. DSpace, GSDL and E-Print are the most popular open source package in this field. These open source solutions provide better control for system administrator with additional power in the hands of users and authors. The Open Source Software applications for library and Information management that will be discussed in this paper are: DSpace, Greenstone and EPrints.

4.1. DSpace

The DSpace is a joint project of the MIT Libraries and HP labs [5]. It is a digital asset management system that allows institutions, such as libraries to collect, archive, index, and disseminate the scholarly and intellectual efforts of a community. Written with a combination of technologies by MIT, it is primarily used to capture bibliographic information describing articles, papers, theses, and dissertations. DSpace is adaptable to different community needs. Interoperability between systems is built-in and it adheres to international standards for metadata format. Being an open source technology platform, DSpace can be customized to extend its capabilities. DSpace Digital repository Modal is represented in figure 3.

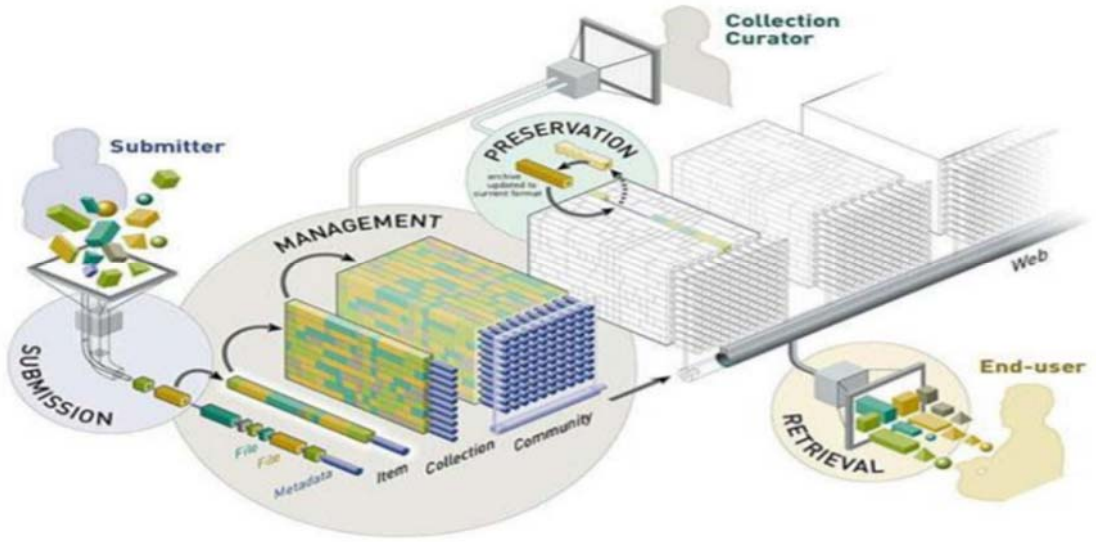

Fig 3. DSpace Digital repository Modal [15].

4.2. Greenstone

Greenstone Digital Library Software is a project from New Zealand that provides a new way of organizing information and making it available over the Internet. Collections of information comprise large numbers of documents (typically several thousand to several million), and a uniform interface is provided to them. Libraries include many collections, individually organized, though bearing a strong family resemblance. A configuration file determines the structure of a collection [15]. Existing collections range from newspaper articles to technical documents, from educational journals to oral history, from visual art to videos, from MIDI pop music collections to ethnic folksongs. Data Modal of Greenstone is represented in figure 4.

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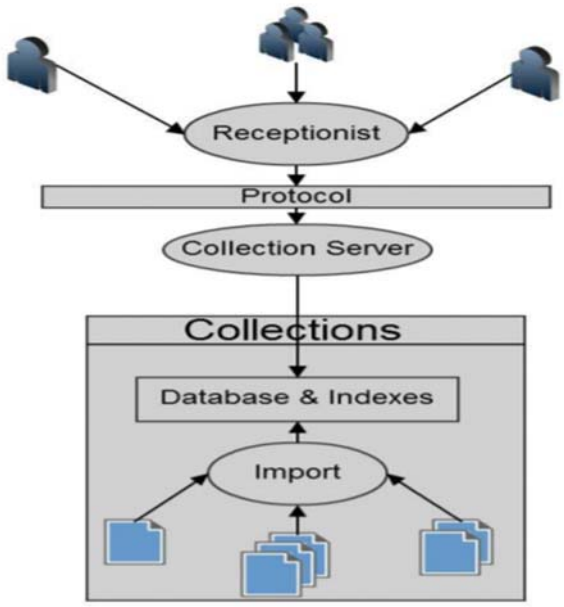

Fig 4: Data Modal of Greenstone

4.3. E Prints

EPrints is free software developed by the "University of Southampton, England". EPrints repository collects preserves and disseminates in digital format the research output created by a research community. It enables the community to deposit their preprints; post prints and other scholarly publications using a

web interface, and organizes these publications for easy retrieval. It is the world's first, most widely used, and by far the most functional of all the available OA IR software's. It is created for and specifically focused on OA functionality. E-Prints is an extensible content management system. It has been extensively configured to accommodate the needs of academics and researchers amid at dissemination and reporting, but it could be easily used for other things such as images, research data, audio archives - anything that can be stored digitally, but you'll have made more changes to the configuration. E-Prints is OAI-complaint. It is highly configurable to achieve diverse needs, built on a coding platform that is amendable to rapid development [23]. E Prints data model is shown in figure 5. Overview of digital library software are shown in table 2.

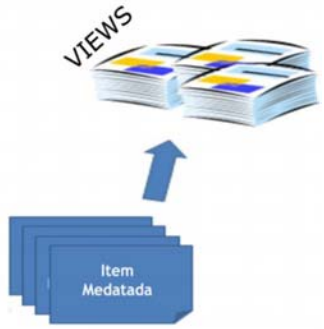

Fig 5: E Prints Data Modal

Table 2: Features of some popular open source Digital Library Software (Dspace, Greenstone and E prints)

	Dspace	*Greenstone (GSDL)*	*E Print*
Developed by	NIT and HP	New Zealand Digital Library Project with UNESCO and Human Info NGO	University of Southampton
Latest Release	*7 July 2020*	*3.2 January, 2020*	3 in July 2020
License	BDS Licence	GPL	GPL
Server O/S	Linux/Win	Win/Lin	Linux
Client O/S	Any	Any	Any
Web Server	Apache	JBoss	Apache
RDBMS	MySql	PostgreSQL	PostgreSQL
Architecture	Web Based	Client/Server Web OPAC is web based	Web based
Requirement	Apache Maven. Apache Ant, Apache IDK, Tomcat, PostgreSQL or Oracle, JDK	Apache, Perl, JRE and JDK	Apache, MySQL and Perl
Language	Java and XML	Perl	Perl
Digital Content Attachment	Yes	Yes	Yes
Web 2.0 Feature	Yes	No	No
Data Migration	Yes	Yes	Yes
URL	http://dspace.org/	http://www.greenstone.org/	https://www.eprints.org/uk/

5. The Scientific Viewpoint DLS Comparison (Google Trends):

The idea about for google trend is discussed in point number 4 and based google trends for Dspace, Greenstone and E-prints results are shown below in figure 3.

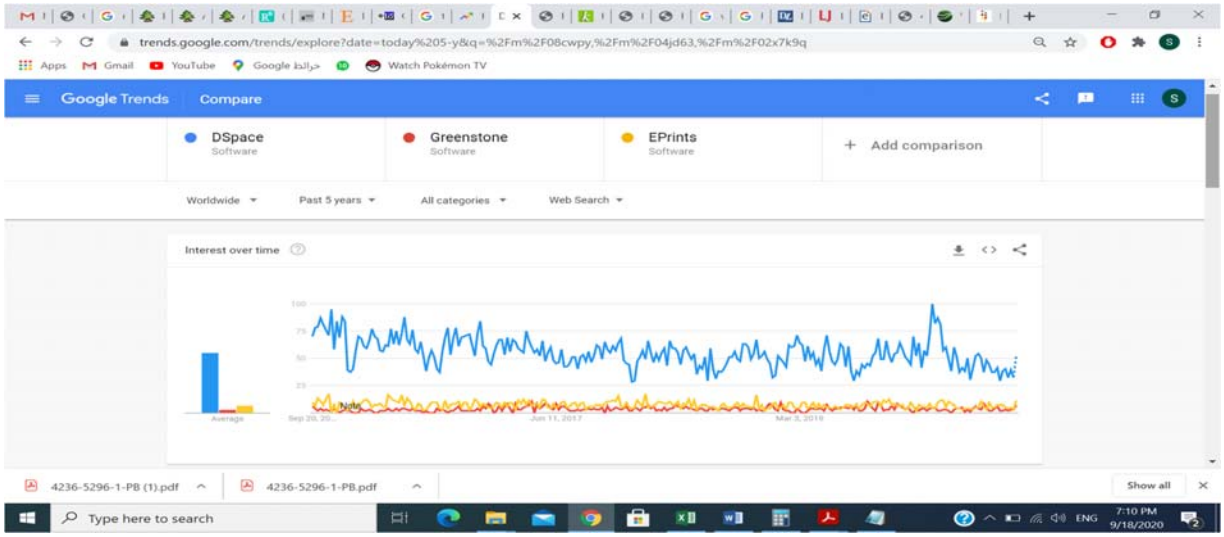

Fig. 3 Search Volume Index for the Data Provided by Google Trends Corresponding to the Dspace, Greenstone and E Prints DL Search Terms

6. Conclusion

Among the several open source options available for libraries, Koha has been identified to be viable, scalable solution for libraries of all kinds; NewGenLib has become very competitive to Koha while Evergreen and PMB possess basic functions of library automation. Evergreen ILS is suitable for use in small libraries because it is easy to install, customize and use. The availability, affordability and flexibility of open-source software has made the stirring of Automated Library System to Integrated Library System possible in our academic libraries. The Digital Library Management software (DLMS) present an easy to use, customizable architecture to create online digital libraries. With these institutions/organizations can disseminate their research work, manuscripts, or any other digital media for preservations and world over dissemination of digital items. The software's discussed above present different services and architectures. It is difficult to propose one specific DLMS system as the most suitable for all cases. The study can be used as a reference guide by any organization or institute to decide which one will be ideal for creating and showcasing their digital collection. The choice usually depends on type/format of material, distribution of material, software platform and time frame etc. for setting up a Digital Library.

7. Future Research

More open source software for libraries either digital or integrated can be added to compare and make sure about further features and compatibility. This software can be implemented in real to see the better results.

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Conflicts of Interest:

The authors declare that they have no competing interests.

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