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Open Source Library Management System Software: A Review

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***Abstract*—**Library management systems are commonly used in all educational related institutes. Many commercial products are available. However, many institutions may not be able to afford the cost of using commercial products. Therefore, an alternative solution in such situations would be open source software. This paper is focusing on reviewing open source library management system packages currently available. The review will focus on the abilities to perform four basic components which are traditional services, interlibrary load management, managing electronic materials and basic common management system such as security, alert system and statistical reports. In addition, environment, basic requirement and supporting aspects of each open source package are also mentioned.

***Keywords*—** open source, library management, review.

I. Introduction

LIBRARY is defined as a place in which books, manuscripts, recordings, films, or reference materials are kept for private or public uses. Typically, a library must be able to handle some housekeeping information such as acquisition, interlibrary loan, cataloging, circulation, serials management, statistical reports and references. A library management system software package is designed especially to handle such housekeeping tasks. A rapidly growing of information technology adds some features to library management system software packages such as features to handle digital media, e-book, e-journals, online public access catalog (OPAC), a feature to connect and exchange information with a digital library system, an ability to connect with networks of libraries, machine-readable cataloging (MARC) standard [7] support and Z39.50 standard [8] support.

In an article wrote by D. Chudnov [6] the founder of the Open Source Systems for Libraries project, three pilot library-related open source software projects were mentioned. These projects are the three main comments of library management system software packages. The first component is a traditional service such as acquisitions (i.e., ordering, receiving of materials), cataloging (i.e., classifying and indexing of materials), circulation (i.e., lending and receiving of materials) and serials management (i.e., managing magazine and newspaper information. The second component is an interlibrary load management system. Because a library may not have a hold of all materials required, an interlibrary loan is a way for its patron to request such materials from other libraries. The last component is a system to manage electronic materials and digital media.

In addition to the above three main components, a library management system software package must contain a commonly shared components such as a user account management feature, a security component, an alert system feature, an accounting system for billing and producing statistical reports or other administrative decision support materials. Thus, the overview picture of the four main components of a library management system software package is presented in Figure 1.

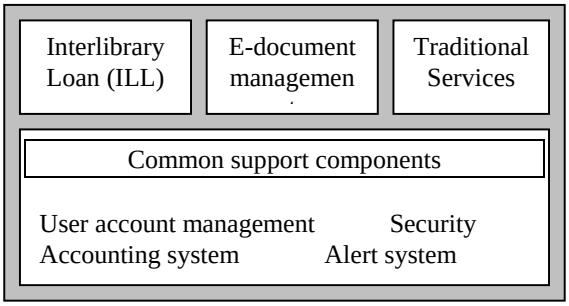

Figure 1 Library management system software components

In the past decade, many commercial products are made available. Examples of widely used commercial products include Millennium [1] from Innovative Interfaces, HORIZON [2] from SirsiDynix, ALEPH [3] and Voyager [4] from Ex Libris, and a list of products and vendors can be found from several sources such as [5],[9]. Many libraries, however, may not be able to afford these commercial products. Furthermore, some libraries may have their own special requirements which may increase the cost. As a result many institutes turn to open source library management system software packages as their alternatives.

This paper is focusing on reviewing open source library management systems currently available. The review will focus on the abilities to perform four basic components mentioned previously. Even though there are a lot of

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publications present reviews of library management system related software packages as listed in the next section, these publications do not focus on the abilities to perform four basic library related components or the compatibility of these software packages. Thus, this paper aims to fill this missing gap.

The remaining of this paper is organized as follows. Section II provides information on related works. Section III lists reviewing methodologies and features to be reviewed. In Section IV, the results are discussed. Finally conclusions are given in Section V.

II. Related Works

As mentioned above, there are a lot of publications on open source library related software packages. However, these publications are focusing either on user satisfactions (e.g., [11],[18],[19], [20],[21]) or on usability of the software package (e.g., [9],[12],[13], [15]). Details of these publications are given below.

Breeding [9] provides general information on the differences between open source software packages and proprietary software packages on common issues and approaches related to integrated library system domain. An overview of integrated library system software packages and a list of proprietary vendors are also given in the paper. A good history on library automation is shown in [14].

With HTML programming and librarian skills, Cargile [12] described her experiences with one of the open source software packages namely MyPhpLibrary from downloading, installing, configuring and testing it. The conclusion drawn at the end of the article suggested that it would be difficult for librarians in small libraries to implement a system on their own. Several possible approaches such as hands-on workshops, intensive classes or extra computer personals could be useful.

Chalon et al. [13] considered several open source integrated library system software packages for a specific library collection. The paper presented approaches that authors were taken in selecting, testing and using the software package. Useful discussions on how they went about finding helps or risks of doing so are also given in the paper.

Buchanan and Krasnoff [15] provided several reasons for using an open source software package in school libraries such as low cost and flexibility. The paper pointed out Koha [16] and OpenBiblio [17] are good candidates because their web-based feature and active development teams.

Riewe [11] conducted a survey by asking about the costs and benefits of open source from 365 librarians and information technology personals mainly from North America continent. The objective of this survey is to find an economical factor and other factors that these personals considered when selecting an integrated library management system software package. However, the survey was focusing on two open source software packages which are Koha and Evergreen.

Breeding [18] presented the 2010 survey results from over two thousands libraries on the subject of their library automation software currently used. The results show that many libraries involved with open source software packages are satisfied with their choices. At the same time, libraries currently employed proprietary software packages are not interested in open source alternatives. Similar survey was conducted in 2009 [19], 2008 [20] and 2007 [21].

In addition, there is several interesting open source software packages for personal collection management such as Tellico [32] or GCstar [33]. However, this type of software packages is excluded in this study.

III. Review Methodology

In this study, several popular open source library management system software packages are reviewed. Table I gives the list of software packages. The focused features to be reviewed are listed in Table II. Table III gives a list of additional information for compatibility consideration.

TABLE I
LIST OF OPEN SOURCE SOFTWARE

Notation	Open Source Software
Koha	http://www.koha.org/ originated in New Zealand
Evergreen	http://www.open-ils.org/ originated in USA
OpenBiblio	http://obiblio.sourceforge.net/ originated in Spain
OPALS	OPen-source Automation Library System http://www.mediaflex.net/ originated in USA
PMB	PhpMyBibli http://www.pmbservices.fr/nouveau_site/ documentation.html originated in French
Emilda	http://www.emilda.org/ originated in Finland
Invenio	http://invenio-software.org/ originated in Europe
NewGenLib	http://www.verussolutions.biz/ originated in India
LearningAccess ILS (LA ILS)	http://www.learningaccess.org/ils-system/ originated in USA
Dspace	http://www.dspace.org/ originated in USA
Greenstone	http://www.greenstone.org/ originated in New Zealand
iVia	http://ivia.ucr.edu/ originated in USA
Eprints	http://www.eprints.org/ originated in UK
BiblioteQ	http://biblioteq.sourceforge.net/
MicroLCS	http://www.avantilibrarysystems.com/ microlcs.html originated in USA

IV. Feature and Compatibility

Information presented here are either collected directly from the software web site or extracted from related publications. The results are grouped by components and features. Section A contains results of basic traditional library management system services. Section B contains results of

electronic document management while the results of interlibrary loan management are given in Section C. Section D presents results of common library management service and additional features. Section E is devoted to environment, development and support aspects of the software packages.

TABLE II
LIST OF FEATURES BY COMPONENTS

Components	Features
Traditional Services	Circulation, Cataloging, OPAC, Acquisitions, Serials management
E-journal Management	Searching, Retrieving, Exporting E-materials
Interlibrary Loan (ILL)	Searching, Placing a hold, Tracking order, Machine-readable cataloging (MARC) standard support, Z39.50 standard support, Import and export of bibliographic records in several formats
Common Support Components	User/patron management, Security, Statistical report generation, Barcode support
Additional Features	Remote access capability, Alert system, RFID support, Multiple language support

TABLE III
LIST OF TECHNICAL COMPATABILITY

Topic	Features
Environment	Operating system, Other related requirements
Development	Programming language, Database management system
Supporting	Online document, Company or active forum supporting the software

A. Traditional Services

Traditional library management system services focused in this section include circulation, cataloging, OPAC, acquisitions and serials management (Table IV). According to the results in Table 4, only Koha, PMB and NewGenLib provide a strong support for all traditional services listed here. On the other hand, Invenio, Dspace, Greenstone, iVia and Eprints are lack of such supports because they are mainly designed for managing digital contents.

B. Electronic Document Management

Electronic document management component support of each software package is under review in this section (Table V). 'Fully support' is selected when the software package can fully manage electronic document such as searching, retrieving and delivering the document. 'Partially support' is selected when the software package can somehow be developed to support an electronic document in its collection. Or, the software package is currently supporting a collection of some electronic document types. Otherwise, the software package will be listed as 'Not support'.

Warrr and Hangsing [10] provide comparative analysis of four popular open source software packages for managing a digital library. The list of software packages includes DSPACE, GREENSTONE, EPRINTS and FEDORA. Several common features such as content management, user interface, interoperable, metadata and system supports are selected to be compared. In addition, a collection of digital library definitions and a list of characteristics of digital library software packages are also given.

TABLE IV
BASIC TRADITIONAL SERVICES

Software	circulation	cataloging	OPAC	acquisitions	serials management
Koha	Y	Y	Y	Y	Y
Evergreen	Y	Y	Y	limited	limited
OpenBiblio	Y	Y	Y	limited	limited
OPALS	Y	Y	Y	Y	
PMB	Y	Y	Y	Y	Y
Emilda	Y		Y	limited	X
NewGenLib	Y	Y	Y	Y	Y
LA ILS	Y	Y	Y		X
Dspace			Y		
Greenstone		Y	Y		
iVia		Y	Y		
BiblioteQ	Y	Y		X	X
MicroLCS	developing	Y	Y		

TABLE V
ELECTRONIC DOCUMENT MANAGEMENT

Software	Fully support	Partially support	Not support
Koha		√	
Evergreen		√	
OpenBiblio			√
OPALS		√	
PMB		√	
Emilda			√
Invenio	√		
NewGenLib		√	
LA ILS		√	
Dspace	√		
Greenstone	√		
iVia	√		
Eprints	√		
BiblioteQ			√
MicroLCS			√

C. Interlibrary Loan Management

Interlibrary loan management support of each software package is under review in this section (Table VI). Since Z39.50 protocol can make several interlibrary loan services, importing/exporting records, saving results or periodic queries possible [31]. MAchine-Readable Cataloging (MARC) [7] is a standard for bibliographic descriptions which allows libraries to exchange or share their information. Therefore, the ability to support MARC and Z39.50 is a good indication of the ability to support interlibrary loan management systems.

D. Common and Additional Services

Common library management system services focused in this section include user/patron management, security, statistical report generation and barcode management support. While additional services include remote access capability, alert system, RFID support, multiple language support and

other supports.

TABLE VI
INTERLIBRARY LOAN MANAGEMENT

Software	Interlibrary loan management capability
Koha	support MARC21, UNIMARC, import/export bibliographic records, allow third-party add-ons, web-services, has option can-reserve-from-other-branches [35]
Evergreen	support search/retrieve via URL and Z39.50 servers
OpenBiblio	MARC support
OPALS	MARC support, Z39.50 support, interlibrary loan features among affiliation locations such as requesting responding and tracking are supported [36]
PMB	UNIMARC support, ability to import full bibliographic records
Emilda	MARC support, Z39.50 support
NewGenLib	MARC21 support, Z39.50 support
LA ILS	MARC21 support, Z39.50 support, integrates and controls access to third-party databases and Web-based resources [28]
BiblioteQ	Z39.50 support
MicroLCS	None

Koha supports user/patron management, statistical report generation, RFID support ability has been reported by some pay-for-support company site [26], support multiple languages and providing an overdue notice/status trigger mechanism.

PMB supports barcode and available in several other languages beside English such as French, Spanish, Italian, Arabic, Dutch and Portuguese. Emilda was reported to be used in Finland. However, there is a security issue reported in [22]. Furthermore, Emilda web site is last updated in 2005. OPALS supports user/patron management and barcode supporting.

Evergreen supports user/patron management, an ability to perform overdue and predue email notification, limited statistical report generation, a remote access via web browser may be possible and also providing a support for session initiation protocol (SIP) [44]. The security precaution pointed out in the document includes strong password, open ports and user permission.

NewGenLib can be extended to support other languages easily. It also provides RFID integration and supports multi-user and multiple security levels. BiblioteQ supports limited user/patron management, collection of books, journals, DVDs, CDs and video games, and available in Czech, German and English languages.

OpenBibilio is suited with small to medium size libraries with limited features. Invenio provides user/patron management, email notification, powerful search engine that combines metadata, fulltext and citation search in one go, Google-like syntax, personalize account, support RSS integration for any query and support multiple output formats such as HTML, XML, MARC and OAI. It can handle medium to big data repositories.

LearningAccess Integrated Library System supports user/patron management, remote access capability via Web-based and support English and Spanish. This software is developed by a non-profit organization thus there is a one-time on-budget cost for support.

Dspace is focusing on managing digital repository supported variety of digital documents such as articles, books, theses, multimedia files and bibliographic. It supports multiple languages. Greenstone provides documentation in several languages such as Kazakh, Vietnamese, Arabic, Spanish, French, Russian and English. It supports multimedia and multilingual documents. iVia is a virtual library software developed at University of California at Riverside. It has ability to run on a single machine scale or a distributed machine scale by distributing its components and using a shared database.

E. Environment, Developments and Supports

This section focuses on environmental development and support aspects of each software package (Table VII.). Note that 'OS independent' means that the software can be operated on Windows, Mac OS and Unix-like operating systems. Having a supporting documentation and an active community are the top two important factors when one selects an open source software package. Thus, a list of online documentation, companies or active forums that currently supported each software package is given in Table VIII. The site is labeled as 'active' if it has been modified within the past year.

TABLE VII
ENVIRONMENT AND DEVELOPMENTS

Software	Environment	Requirement	Language
Koha	OS independent	Apache, MySQL	Perl
Evergreen	Linux	PostgreSQL	C, Perl, Python
OpenBiblio	Windows, Linux	Apache, MySQL	PHP
OPALS	Red Hat, CentOS	Apache, MySQL, Zebra	Perl
PMB	OS independent	HTTP server, MySQL	PHP
Emilda	Windows [25] with difficulties [13], Linux	a Web server, SQL database server, Zebra	PHP
Invenio	Unix-like OS	Apache, MySQL	Python
NewGenLib	OS independent	PostgreSQL, JBoss Application Server	JAVA
Dspace	UNIX-type OS		JAVA
Greenstone	OS independent		C++, Perl
iVia	Linux	Apache, MySQL	C++, JAVA
Eprints	UNIX-type OS, Windows XP, Vista, OS-X		Perl
BiblioteQ	OS independent	PostgreSQL	C++
MicroLCS	UNIX, Windows	a Web server	JAVA

V. Conclusions

In this paper, several open source software packages related to library management systems are reviewed. The review is focusing on four main components in a library management system including traditional services, electronic document management, interlibrary loan support and common services such as user management, security and statistical report generation ability. In addition to these four main components, features such as RFID support, alert system, multiple language

support and remote access capability are also mentioned. To organize the technical compatibility of each software package, the supported environment, programming language requirement, basic requirement, active software support forums or companies and the availability of online documents are also reviewed.

TABLE VIII
SOFTWARE SUPPORTS

Software	Supports
Koha	an active online community [16], a list of pay-for-support companies [26]
Evergreen	an active online community [37] including FAQs, Documentation, a supporting company [27]
OpenBiblio	an active online community [17] including Forums, Documentation, Add-ons, another active community [45]
OPALS	a supporting company [38]
PMB	a supporting company [24]
Emilda	an online document and related information [23]
Invenio	an "as is" basis at [29], both free support via community chartroom and paid supports are available
NewGenLib	an active online community [30] including Forums, Documentation
LA ILS	a limited information site [28], support available with a on-time on-budget cost
Dspace	an active online community [39] including Forums and Documentation
Greenstone	an active online community [40] including related information such as FAQs, consulting company
iVia	a site containing related information [41]
Eprints	an active online community [42]
BiblioteQ	a rather limited information web site [43]
MicroLCS	an online document [34]

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