

Success and Abandonment of OSS Library Management Systems

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ABSTRACT

The purpose of this article is to study the open source library management systems (LMSs) and to find the present development. The development and community activity is studied by examining 'release activity' and 'mailing list /discussion forum activity by applying different the methodologies. Other aspects of open source library management systems such as longevity, features, license, documentation, technology used are also studied. It is found that out of 31 open source library management systems only 15 systems are currently active. Maximum active open source LMSs have institutional support. Fifty per cent of LMS project are inactive or abandoned. This study covers success and abandonment aspects of open source LMSs and provides current status open source library management systems.

Keywords: Library management system, integrated library system, success, abandonment

1. INTRODUCTION

Richard Stallman launched the GNU project in 1983 and published the first GNU Public Licence (GPL) in 1989. This leads foundation of free software development movement. In 1998, another group of individuals expressed problem with the term 'free software' and not with the concept, as the term is confusing and ambiguous and advocated the term 'open source software'¹. However, there is difference of opinion among both groups. Some people use the term 'Free and Open Source Software'. Development of free and open source software (FOSS) for libraries started around 1999. Some of initially developed software are Prospero, JAKE, MyLibrary, LOCKSS, Openbook, Koha, etc.²

Since then there has been continuous development in library related open source software. As on date there are number of software developed in different area of library such as digital library, e-resource management, library management system, OPAC, federated searching, link resolves, indexing searching, etc. However, there is a question that how many projects have been succeeded and how many are abandoned. Many project become inactive just after their initial release. Vast majority of the available open source products are not useful for information technology organisation. Very small portion of them is useful however, that small portion also represents

large number of products and therefore those products must be assessed for their maturity for a particular organisation³.

2. LITERATURE REVIEW

Extensive literature is available on the area of open source software. Schweik & English⁴ covered detailed study of factors that lead some OSS to success and other to abandonment. They also provide success/abandonment classification system⁴.

Khondhu⁵, *et al.* has made three categories of the projects, such as, active, dormant, and inactive, based on update activity and presents an analysis of the population of projects contained within SourceForge.net. Piggott & Amrit⁶ mentioned time-invariant and time-variant variables that can influence the success of an OSS project⁶. Rainer & Gale⁷ have done preliminary evaluation of the quality and quantity of data on open source (OS) projects, provided at the SourceForge.net portal⁷. Muller⁸ identified 20 open source integrated library systems and analysed these systems using three-step process, such as, licensing, community and functionality. Breeding⁹ looks open source ILS viability from four perspectives: Market acceptance, support options, product development and functionality, and risk factors⁹. Balnaves¹⁰ has evaluated seven open source library management systems (LMS)

on five dimensions such as functional dimension, architecture dimension, community dimension, code dimension, and schema dimension. Boss¹¹ identified 12 integrated LMSs with some current development activity underway as early 2008. DeVoe¹² provides an overview of nine open source systems integrated library.

Boss¹³ provides criteria such as, current active development, functional feature, source code, MARC, scalability for evaluating open source software and evaluated 12 open source LMSs. Breeding¹⁴ provides detailed information about four LMS. He also provides information on trends in open source ILS adoption. Breeding¹⁵ gives up-to-date information on Koha Evergreen and learning access ILS. Breeding¹⁶ suggests that OSS should be evaluated for their own merits in features, proven reliability, support, and vision and gives details about Koha, Learning Access ILS, and Avanti Micro LCS ILS¹⁶.

2.1 Release Activity

The release activity shows the progress made by the developers, i.e., development activity. These activities reflect in writing or in changing the source code. Software projects release new versions after a certain period. The no. of releases and their significance (feature additions release or bug fixes release) indicate progress made by the developers. The information about release is available in release notes, project change log, etc. The open source projects have also different types of releases, such as, stable version and developmental version ('beta', daily builds' or CVS)¹⁷. Release activities measured by using the release frequency and significance per releases, i.e., (a) Number of releases made per period and (b) Significance of each release^{17,18}.

2.2 Community Activity

In case of open source software, the active community is very important because in most of the cases community makes testing and provides feedback. The support and community are interrelated because in most of the cases support is provided by community members. There are two types of supports—free support and paid support. The community members mostly provide free support through mailing list, discussion forum, documentation, blogs, etc., while paid support is provided by software supporting company or any other third party.

The user community of an open source project

consists of the people who use the software and participate in some way. One way of participation is by filing bug reports. Another is giving feedback on functionality of project. The community defines much of the activity and reflects in other areas, such as, support, and documentation¹⁷. 'The community activity can be measured with no. of posts per period, no. of topics, no. of users, response time, quality of post and replies, friendliness in community¹⁷.

3. OBJECTIVES

The objectives of the present study are to:

- Determine project status of various available open source LMSs by studying release activity and community activity; and
- Study the related aspect of the system such as longevity, functionality, documentation, license, and technology used.

4. METHODOLOGY

For this study the data about the availability of open source LMS is taken from the study of survey conducted by Londhe & Patil¹⁹. The data for release activity and community activity is collected from respective websites of the projects, available on sourceforge.net and from the websites of the projects, which have their own websites. For release activity the data like, first release, last release, number of releases and date of releases are collected. For community activity, the data like the number of posts in mailing list, forum, and dates of posts are collected. For the classification and to determine the status of LMSs projects, methodology developed by Scheweik and English⁴ is used and for further categorization of projects, a methodology developed by researchers on the basis of available literature, is used.

For the present study, only the number of releases is considered. Following formula is used for calculating release activity score:

$$\text{Release activity score} = \frac{\text{Number of releases}}{(\text{Year of last release} - \text{Year of first release})}$$

For community scoring number of messages, posts in mailing lists and forum are taken into account. The number of messages are manually calculated, if the total numbers of counts are not available. Release activity and community activity are measured using five point scale metrics mentioned in Table 1, which is based on Business Readiness

Table 1. Metrics for release activity and community activity

Category	5- Excellent	4-Very good	3- Acceptable	2- Poor	1 Unacceptable
Release activity	2 or more than 2 releases per year	-----	1 release per year	Less than 1 release per year	-----
Community activity (mailing list & discussion forum)	More than 300 posts /messages per months	300-120 posts / messages per month	120-60 Post or messages per month	60-30 posts/ messages per month	Less than 30 posts/ messages per month. Or No mailing list.

Rating model²⁰. However, figures in community metrics are modified. More than 300 messages/posts per month are set as excellent and other figures are set accordingly. These 300 figures are based on Koha mailing list. In Koha general mailing list, on an average, more than 300 messages per month are posted. Koha is the most popular open source LMS and is worldwide used by library community.

To find methodologies to categorise open source projects, literature on the topic is searched. Following some of the methodologies relevant to this topic are found.

Khondhu⁵, *et al.* has made three categories of the projects, such as, active, dormant, and inactive based on update activity. They define: ‘active’ project: whose activity is updated and recent; the ‘dormant’ project: whose activity is visible in the past evolution but it has stopped (due to any reason) for a defined period (e.g., one year, two years, etc.); ‘inactive’ project: which have been explicitly marked as inactive by the previous developers⁵. They also argue that open source software project inactivity should be evaluated on the basis of pre defining an interval time when no development activity such as commits, messages on the mailing lists or public releases have been taken place in the project.

‘The SourceForge.net maintains a system of 7 status designations. Such as Planning, Pre-Alpha, Alpha, Beta, Production/Stable, Mature and Inactive⁶.

Schweik & English⁴ identified two longitudinal stages that open source projects go through:

- (i) Initiation stage—describes the period from project start to the first public release of software.
- (ii) Growth stage—describe the period after a project’s first public release of code.

They define, both theoretically and empirically, a method to measure whether a project is successful or abandoned in these two stages. They have identified following six categories of success and abandonment. SI: Success in Initiation; AI: Abandonment in Initiation; SG: Success in Growth; AG: Abandoned in Growth; II: Indeterminate in Initiation; IG: Indeterminate in Growth^{4,21}.

As per the Schweik & English methodology, the project can be placed in to six categories. However, what is status of project after ‘Success in Growth’ phase if there are no developments i.e., further releases for longer period.

Wheeler mentions that project might stabilise over the time as it is completed but needs change, new uses are continuously created, and no program of any kind is perfect. It is important that a program is being maintained, and that it will be maintained far into the future²².

To further classify the projects, which are ‘success in growth’ phase and do not have releases and community activity for long period, following metrics are applied.

In this, metrics projects having more than 5 years inactivity in release and more than two years inactivity in community are placed in category of inactive or abandoned. However, these projects have not been tagged as inactive by developers on project website and shows download activity.

5. ANALYSIS

The analysis of all these software gave the following results:

The list of available 31 open source LMS along with their features is given in Table 3. Out of these thirty-one systems, two are e-book management systems¹⁹.

5.1 Release Activity

The release activity is scored on five-point scale, which is mentionable in Table 1. Table 3 shows that out of 31 projects, 19 projects have shown excellent release activity, which has scored to five. Seven projects show acceptable release activity, which is scored to three. Five projects release activity could not be determined because of unavailability of code files on project website and due to restriction of downloading. Out of these five, only Gnuteca and Open Amaptheque seem to be active.

Figure 1 shows release activity. Out of 19 projects, which have shown excellent release activity, three projects, such as, GPL library system, infoCID, and Java cataloguing system don’t have release for long time.

5.2 Community Activity

The community activity is scored on five-point scale as per Table 1. Figure 1 shows community activity of 31 projects. Out of these 31 projects, community activity score of eight projects is 3 or more and for remaining projects it is 1. The community activity score of some of the excellent

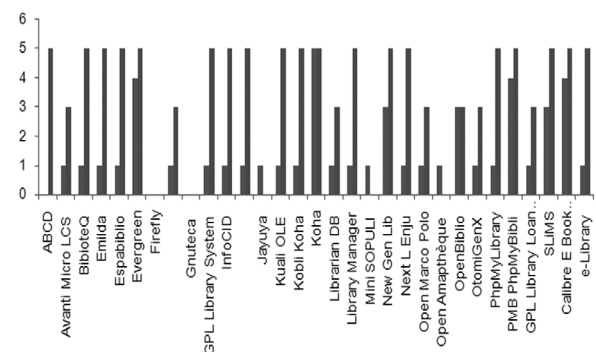


Figure 1. Release activity and community activity score.

release activity projects, such as, BiblioteQ, Espablio, KualiOLE, KobliKoha, librarianDB is also one. Among these active projects, Kuali OLE has recently begun and this is one of the reasons for low community activity. Other projects, such as, Espablio, Kobli koha are language specific projects and this may be the reason for low community activity. Community activity of the Firefly and Gnuteca could not be determined due to unavailability of data and problem with registration process of mailing list. In this category, Koha is having highest score. Evergreen, PMB and Calibre E book management system have occupied second position. Third position has been obtained by ABCD, NewGenLib, Openbiblio, SLIMS.

5.3 Project Score Based on Release Activity, Community Activity (Combined)

Figure 2 shows the total score of LMS projects based on release activity and community activity. The positive scale area of graph shows the score of active LMS projects. The negative scale area of graph shows the score of inactive projects. The absence of bar shows unavailability of the release and community data of LMS projects.

Among the active projects, only 7 LMS projects, such as, ABCD, Evergreen, Koha, NewGenLib, PMB, SLIMS, and Calibre book management is having more than six score. All remaining LMS projects have six or less than six score. Kuali ole and Next-L Enju are the viable candidates and both are in initial development phase, therefore community activity score of both is low and thereby low overall score.

In case of inactive projects, there is not even a single project, which has scored more than six. The score of five inactive projects could not be determined due to unavailability of data.

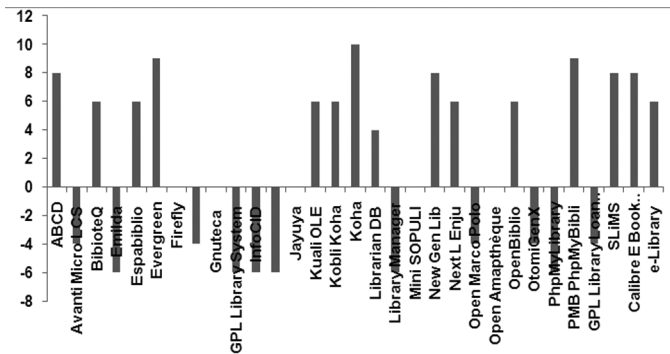


Figure 2. Combined score of LMS projects.

5.4 Projects Status

To find present developmental status of the LMS projects, two methodologies are used, which are mentioned in Table 1 and Table 2. Table 4 shows the status the of project on the basis of Schweik & English methodology and Table 2 metrics.

Table 2. Project status

Category	5- Active	3- Dormant	1-Inactive/ abandoned
Releases gap	DS- DLR < 2 years	DS- DLR > 2 and < 4 years	DS- DLR > 4 years
Date of latest forum or mailing list activity	DS- LFMA < 1 years	DS - LFMA >1 and < 2 years	DS - LFMA >2

Date of last release (DLR); Date of sampling (DS); Date of latest forum or mailing list activity (LFMA).

5.4.1 Status of Projects

Table 4 shows there are 20 projects, which are under the 'success in growth' category, and 10 projects are under the 'abandoned in growth' category.

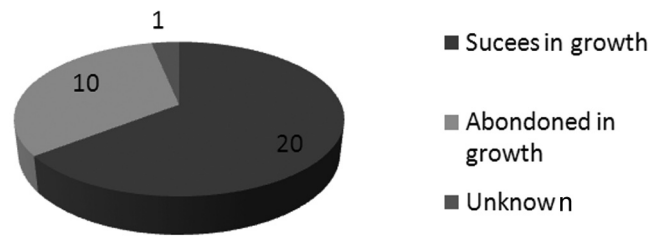


Figure 3. Status of projects as per Schweik and English methodology.

One project's status could not be determined. 67% projects are success in growth (Fig. 3).

5.4.2 Status of 'Success in Growth' Project

As per metrics in Table 2, Table 4 shows that out of 20 'success in growth projects', there are only 13 projects, such as, ABCD, BiblioTeq, Espabiblio, Evergreen, KualiOLE, KobliKoha, Koha, , NewGenLib, Next-L Enju, Openbiblio, PMB, SLiMS, Calibre E-book Management System, which has active status in release as well as community activity. While the elibrary's release activity is dormant and community activity is active, conversely, Librarian db's release activity is active and community activity is dormant. As one of the activity of these 2 projects is coming under active status. Therefore, they are included in active status category.

In all as per both methodologies there are 15

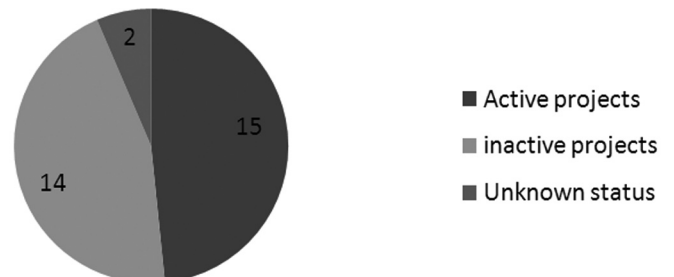


Figure 4. Activeness of projects as per table 2 methodology

Table 3. Open source library management system

S. No.	Name of software	Functionality	Release activity (RA)	Community activity mailing list/forum (CA)	Project status (PS)	Total score = RA+CA
1.	ABCD	Administration, Technical processes, Statistics, Services, Loans circulation OPAC, Periodical control	Excellent	Acceptable	Active	8
2.	Avanti	OPAC and Catalogue	Acceptable	Unacceptable	Inactive/abandoned	4
3.	BiblioTeq	Cataloguing, basic circulation, module, and OPAC module	Excellent	Unacceptable	Active	6
4.	Emilda	OPAC, circulation and administration functions	Excellent	Unacceptable	Inactive/abandoned	6
5.	Espabiblio	Circulation, Cataloging, Administration, OPAC, Reports,	Excellent	Unacceptable	Active	6
6.	Evergreen	Acquisitions, OPAC, Cataloging, Circulation, Administration, Serials,	Excellent	Very good	Active	9
7.	FireFly	---	---	---	Inactive/abandoned	---
8.	Glibms	Acquisition, catalogue and basic circulation	Acceptable	Unacceptable	Inactive/abandoned	4
9.	Gnuteca	Managerial processes, Technical processing, Circulation, Consultancy and recovery, Internet- library	----	----	Unknown	----
10.	GPL Library System	Catalogue, OPAC and basic circulation modules	Excellent	Unacceptable	Inactive/abandoned	6
11.	infoCID	Administration, consultation, loan repayment, statistics, inventory, etc. (37)	Excellent	Unacceptable	Inactive/abandoned	6
12.	Java Book Cataloguing System	Catalogue	Excellent	Unacceptable	Inactive/abandoned	6
13.	Jayuya	Catalogue, Circulation, Statistics	--	Unacceptable	Inactive/abandoned	--
14.	Kuali Open Library Environment	Select and Acquire, Describe and Manage, Deliver, and System Integration	Excellent	Unacceptable	Active	6
15.	Kobli Koha	Administration, cataloguing, circulation, OPAC, Serial etc.	Excellent	Unacceptable	Active	6
16.	Koha	Administration, circulation, cataloging, acquisitions, reports, serials, patron management, etc.	Excellent	Excellent	Active	10
17.	Librarian DB	Catalogue, OPAC	Acceptable	Unacceptable	Active	4
18.	Library Manager	Basic catalogue, OPAC, circulation	Excellent	Unacceptable	Inactive/abandoned	6
19.	MiniSOPULI	--	----	Unacceptable	Inactive/abandoned	----
20.	NewGenLib	Acquisitions, technical processing, serials management, circulation, administration, MIS Reports, OPAC, Allow digital attachment to metadata	Excellent	Acceptable	Active	8
21.	Next L Enju	Cataloging, Patron management, Circulation, discovery interface.	Excellent	Unacceptable	Active	6
22.	Open MarcoPolo	OPAC, Circulation, Administration, Statistics	Acceptable	Unacceptable	Inactive/Abandoned	4
23.	Open Amapthèque	Cataloguing, Circulation, Budget monitoring, management of internal research publication etc.	Download link is not working	Unacceptable	Unknown	----
24.	Openbiblio	OPAC, circulation, cataloging, and staff administration	Acceptable	Acceptable	Active	6
25.	OtomiGenX	Catalogue, loan, Search modules.	Acceptable	Unacceptable	Inactive/Abandoned	4
26.	PhpMy Library	Cataloging, circulation, and the web opac etc .module	Excellent	Unacceptable	Inactive/Abandoned	6

27.	PMB PhpMyBibli	Circulation, Cataloguing, Reports SDI, Administration, Acquisition, Serial management	Excellent	Very good	Active	9
28.	Seansoft GPL Library loan management system	Cataloguing, Loan, Search	Acceptable	Unacceptable	Inactive	4
29.	SLiMS	Bibliography (Cataloguing) Membership, Circulation, Stock taking, reporting, Serial Control, OPAC	Excellent	Acceptable	Active	8
30.	Calibre E- book mana-gement system	Library Management, E-book conversion, Syncing to e-book reader devices, E-book editor for the major e-book formats etc. (52)	Excellent	Very good	Active	9
31.	e-Library	Books and eBooks library organiser. Catalogte, tag and search your books database	Excellent	Unacceptable	Active	6

Table 4. Status of project on the basis of Schweik and English⁴ methodology and table 2 methodology

S. No.	Project name	Status of the project (Schweik & English)	Status of SG projects (Table 2 methodology)	Remarks
1.	ABCD	Success in growth	Active	
2.	Avanti	Success in growth	Inactive/abandoned	No release since 2007
3.	BiblioTeq	Success in growth	Active	
4.	Emilda	Success in growth	Inactive/abandoned	No release since 2005
5.	Espabiblio	Success in growth	Active	
6.	Evergreen	Success in growth	Active	
7.	FireFly	Abandoned in growth		
8.	Glibms: GNU Library Management System	Abandoned in growth		3 releases in less than 6 months and No release since 2002
9.	Gnuteca	Success in growth	Unknown	
10.	GPL Library system	Abandoned in growth		3 releases in less 6 than months no release since July 2010
11.	infoCID	Abandoned in growth		2 releases in same month and no release since 2005
12.	Java Book Cataloguing System	Abandoned in growth		3 releases in less 6 months and no release since 2000
13.	Jayuya	Abandoned in growth		Release history not found and No release since 2006.
14.	Kuali Open Library Environment	Success in growth	Active	
15.	Kobli Koha	Success in growth	Active	
16.	Koha	Success in growth	Active	
17.	Librarian DB	Success in growth	Active	
18.	Library Manager	Abandoned in growth		2 releases in same month and no release since 2002.
19.	MiniSOPULI	Abandoned in growth		Code is not available
20.	NewGenLib	Success in growth	Active	
21.	Next L Enju	Success in growth	Active	
22.	Open MarcoPolo	Abandoned in growth		2 versions found on website and no release since 2008
23.	OpenAmapthèque	Unknown	Unknown	-----
24.	Openbiblio	Success in growth	Active	
25.	OtomiGenX	Success in growth	Inactive/abandoned	2 versions found on website and no release since 2009 (3.0 version)

26.	PhpMyLibrary	Success in growth	Inactive/abandoned	No release since 2006
27.	PMB PhpMyBibli	Success in growth	Active	
28.	Seansoft GPL Library Loan Management System	Abandoned in growth		Only one version is released no release since 2001
29.	SLiMS (Senayan Library Management System)	Success in growth	Active	
30.	Calibre E-book Management System	Success in growth	Active	
31.	eLibrary	Success in growth	Active	No release since 2011

projects are active and success in growth out of 31 projects and 14 projects are inactive (Fig. 4). The status of 2 projects—OpenAmaptheque and Gnuteca (present activity), has not been determined due to the problem of download; therefore, its status has been set as unknown. This study also reveals that the score of the community activity of all inactive projects is one, which is unacceptable.

Among inactive projects, PhpMyLibrary was a good project having necessary functionality with excellent release activity. However, since 2006 there has been no further release. However, it shown considerable number (32) of weekly downloads on sourceforge.net. The project Emilda, OtomiGenx, Glibms, Java book cataloguing system have shown 9, 12, 26, and 4 weekly downloads, respectively and other 4 projects shown 1 weekly download at time of data collection. Some projects download statistics is not available.

5.5 Longevity of Active Projects (Age)

A key indicator of software maturity is its age. Software, which is available for a long period, tends to be more mature. The longevity of the product can be assessed using version number, life span of the product, and total number of downloads²³. Age can

be established using the date of the first release of the software.

Table 5 shows age of the project since its first release. The release history of Espabilio is not available; therefore, among the available versions on project website, the oldest version is considered. Out of 16 projects, 11 have more than 6 years longevity. Koha is the one of oldest softwares and has more than 15 years' longevity. Gnuteca, OpenBiblio and PMB also have more than 10 years of longevity. Among the inactive projects, only Avanti MicroLCS and PhpMyLibrary continued for more than four years. All other remaining projects discontinued within a very short span.

5.6 Functional Features of Active Projects

Functionality is an important aspect of any kind of software. Table 6 shows the availability of basic main modules, such as, acquisition, cataloguing, circulation, serial, OPAC of active projects. Out of 16 LMS, Nine systems have all five basic modules. Two systems are specially developed for e-book management. BiblioteQ have catalogue, circulation, OPAC but circulation module has very limited functionality and OPAC modules are separately

Table 5. Longevity of active projects

S. No.	Name of project	Year of first release	Age of project (as on Dec. 2014)
1.	ABCD	First Beta version released in September 2008 1.0 Dec. 2009 (Production version)	6.2
2.	Biblioteq	Version 2.00 (Pre-Alpha) in January 2007	8
3.	Espabilio	Espa 2.2 B-2 in January 2012	3
4.	Evergreen	Alpha version released in Aug. 2005 Version 1.0 released in Sept. 2006	9.3
5.	Gnuteca*	--- Feb. 2002	12.9
6.	Kuali OLE	Version 0.3 November 2011 (First public release)	3
7.	KobliKoha	Kobli 1.4 in June 2011	3.5
8.	Koha	September 1999 : Work starts on Koha.Koha 1.00 put up for download in July 2000	15.2
9.	Librarian DB	Librariandb-0.1 in May 2007	7.6
10.	NewGenLib	1.0 was released in March 2005. In January 2008, it was declared OSS	9.8 *7
11.	Next-L Enju	Next-L Enju - 1.0.0.beta in March 2011	3.8
12.	OpenBiblio	Beta version 0.1.020 in April 2002	12.7
13.	PMB PhpMyBibli	---2002	12
14.	SLiMS	November 2007 Senayan 3 Stable1 in March 2008 (Public release)	7
15.	Calibre E-book	Libprs500, 2006 was renamed as Calibre in mid-2008	8
16.	eLibrary	1.0.0 in November 2008	6

*Status unknown

Table 6. Functional features of active projects

S. No.	Name of software	Acquisition	Cataloguing	Circulation	Serial	OPAC	New generation feature
1.	ABCD	Yes	Yes	Yes	Yes	Yes	ABCD site (CMS)
2.	BiblioTeq	----	Yes	Yes**	----	Yes	----
3.	Espabiblio	----	Yes	Yes	----	Yes	CMS based on WordPress, digital file attachment to metadata
4.	Evergreen	Yes	Yes	Yes	Yes	Yes	-----
5.	Gnuteca*	Yes	Yes	Yes	Yes**	Yes	-----
6.	KualiOpen Library Environment	Yes	Yes	Yes	Yes	Yes	ERM
7.	KobliKoha	Yes	Yes	Yes	Yes	Yes	-----
8.	Koha	Yes	Yes	Yes	Yes	Yes	CMS
9.	Librarian DB	---		Yes		Yes	-----
10.	NewGenLib	Yes	Yes	Yes	Yes	Yes	Allow digital attachment to metadata
11.	Next L Enju	Yes**	Yes	Yes	Yes	Yes	----
12.	Openbiblio	----	Yes	Yes	---	Yes	-----
13.	PMB PhpMyBibli	Yes	Yes	Yes	Yes	Yes	Digital attachment to metadata
14.	SLiMS	----	Yes	Yes	Yes**	Yes	Digital attachment to metadata
15.	Calibre E-book Management System	----	----	----	----	----	E-book management and conversion, Syncing to e-book readers, e-book editor for major e-book formats, etc.
16.	eLibrary						E-Books management

*Unknown status; ** Limited functionality

available, needs to be integrated with desktop version. Acquisition and serial modules are absent in Espabiblio and Openbiblio but Espabiblio has CMS and digital files attachment functionality. Librariandb has only catalogue and OPAC modules. In SLiMS, acquisition module is not available but provision to add basic acquisition data with record. It shows that some systems tried to incorporate the new generation library management system features but they are at very preliminary level except Kuali OLE.

5.7 License

It has become apparent that maximum number of library management systems are released under GNU GPL. Some systems are an exception, such

as, ABCD, Open Marco Polo, and Java cataloguing system. These systems are released under LGPL. BiblioteQ is released under BSD license. Gnuteca is released under CC-GNU GPL. Kuali OLE is released under Education community license, but now under AGPL. Next-L Enju are released under MIT license. PMB was initially released under GNU GPL; now it is released under CECILL. Some software reuses several other libraries and modules, these libraries and modules retain their original licenses

5.8 Documentation

The LMS such as, ABCD, Evergreen, Koha, Kuali Ole, NewGenLib, Next-L, Enju, SLiMS provide comprehensive documentation on different aspects of the software.

Table 7. Technology used by software

S. No.	Name of software	Programming language	Operating system support	Database, application/web server	Other components
1.	ABCD	PHP v.5 and ISIS script, Java script and AJAX, JDK 1.5	Windows and Linux	Apache, MySQL	MARC, Z39.50, web-based
2.	BiblioteQ	Qt 4 and C++, etc.	FreeBSD, Linux, Mac OSX, Solaris Windows	Postgresql or SQLite	MARC, Z39.50, standalone, OPAC is web-based.
3.	Espabiblio	PHP, JavaScript, HTML	Mac, Linux, windows or anything that supports Apache	MySQL, Apache	MARC, Z39.50, Web-based
4.	Evergreen	Perl, C, JavaScript, XML, X Path, XSLT, XMPP	Linux (Client for window, Linux) (18)	Apache, PostgreSQL, Jabber, OpenSRF	MARC, Z39.50, client server, OPAC web-based

5.	Gnuteca	PHP, Perl	Linux	Postgresql	MARC, Z39.50, web-based
6.	Kuali OLE	Java, maven etc.	Windows, Mac OS X, Linux	Apache tomcat, MySQL	MARC, Z39.50, web-based
7.	KobliKoha	Perl, etc.	Linux	Apache, MySQL	MARC, Z39.50, web-based
8.	Koha	Perl, etc.	Linux	Apache, MySQL	MARC, Z39.50, web-based
9.	Librarian DB	PHP	Linux	MySQL	Web based
10.	NewGenLib	Java	Linux, Window	Postgresql, Apache ant	MARC, Z39.50, web-based
11.	Next L Enju	Ruby on Rails, Ruby, Java SE 7	Multiplatform	MySQL/PostgreSQL/SQLite	MARC, Z39.50, web-based
12.	OpenBiblio	PHP, etc.	Linux, windows	MySQL, Apache	MARC, Z39.50, web-based
13.	PhpMyBibli	PHP, etc.	Linux, Windows, Mac OS	Apache, MySQL	MARC, Z39.50, web-based
14.	SLiMS	PHP, AJAX	Windows, Linux/Unix	MYSQL, Apache	MARC, Z39.50, web-based
15.	Calibre E-book	QT 5, Pythan, C, C++, etc.	Window , Linux, OS X	----	Standalone but contents can be accessed via web
16.	eLibrary	C++	Windows	----	Standalone but contents can be accessed via web

5.9 Technology Used

Table 7 reveals that all active LMSs have MARC and Z39.50 functionality. MySQL is the favourite database management system among the developers and PHP is a preferred programming language.

6. CONCLUSIONS

This study covers historical overview of development and current status of LMS library management systems. Apart from community and release activity, other technical information about LMS systems, such as, functionality, longevity, documentation, license, technology used is also examined. 31 open source LMS projects, which are developed during 1999 to 2014. However, only 50 % projects are active today. Most of the projects became inactive or abandoned within short period after their initial release and mostly in growth phase. Most of abandoned projects having 2 or 3 release in less than 6 months after their initiation. This study reveals that maximum number of active projects is having an institutional support. Among active projects, only 7 LMS projects such as ABCD, Evergreen, Koha, NewGenLib, PMB, SLiMS, and Calibre book management performed well as per combined score of the release and community activity. However, Kuali Ole and Next-L Enju are viable candidates and have evolving community. This study reveals that there are considerable number of weekly downloads for old releases of some inactive projects.

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