Five Laws and Ten Commandments: The Open Road of Library Automation in India

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Abstract

This paper discusses development of library management software over the years and emerging of open source software solutions for library management as viable alternatives to commercial closed products. It discusses Koha as the most feature rich library automation software in the domain and reports development of Unicode-compliant Bengali version of Koha for college libraries and public libraries in West Bengal.

1 Introduction

Library Management Software (LMSs) are now established as an essential tool in the support of effective customer service, stock management and management of services offered by libraries. These are based on knowledge and experience of library professionals over the centuries. The rapid growth in utility of hardware, software & connectivity and reduced costs gives the development of LMS a vital breakthrough to achieve a remarkable height. Current LMSs are integrated systems, based on relational database architecture. In such systems files are interlinked so that deletion, additions and other changes in one file automatically activate appropriate changes in related files (Mukhopadhyay, 2001). As per the availability and distribution policy, LMSs are divided into two groups – closed source commercial products and open source free to use products. Commercial LMSs are available against huge license fees along with separate annual maintenance contracts, updating fees and many other hidden costs. As a result, adaptation of a commercial LMS in library is not a one-time capital expenditure but it leads to considerable recurring expenditure on already strained library budget. Moreover, these commercial LMSs are basically available in a generic or fit-to-all size model and provide no scope for customization to suite the need of a particular library. This is an alarming situation for libraries in India. Libraries are paying huge sum to procure commercial LMS but unfortunately not in a position to even change the colour of the user interface. Another serious lacuna is the non-transparent nature of these software in the use of standards like EDIFACT, ISO-2709 or Z39.2, Z39.50, Z39.71 etc. On the other hand, open source LMSs are emerging rapidly as viable alternatives to their commercial counterparts.
2 Library Management Software: Progress over the years

Software upgradation is a continuous process. LMSs are no exceptions. LMSs developed in all parts of the world from mid 1970s to till date may broadly be divided into four different generations. LMSs of first generation were module-based systems with no or very little integration between modules. Circulation module and cataloguing module was the priority issue for these systems and were developed to run on specific hardware platform and proprietary operating systems. The second generations LMSs become portable between various platforms with the introduction of UNIX and DOS based systems. The LMSs of this generation offer links between systems for specific function and are command driven or menu driven systems. The third generations LMSs are fully integrated systems based upon relational database structures. They embodied a range of standards, which were a significant step towards open system interconnection. Colour and GUI features, such as windows, icons, menus and direct manipulation have become standards and norms in this generation. LMSs of fourth generation are based on web-centric architecture and facilitate access to other servers over the Internet. These systems allow accessing multiple sources from one multimedia interface. A comparative study (Mukhopadhyay, 2005) of features and facilities in products of different generations are given as table 1.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Features</th>
<th>1st Generation</th>
<th>2nd Generation</th>
<th>3rd Generation</th>
<th>4th Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Programming Language</td>
<td>Low level language</td>
<td>COBOL, PASCAL, C</td>
<td>4 GL</td>
<td>OOPS</td>
</tr>
<tr>
<td>2</td>
<td>Operating System</td>
<td>In house</td>
<td>Vendor Specific</td>
<td>UNIX, MSDOS</td>
<td>UNICES, Windows</td>
</tr>
<tr>
<td>3</td>
<td>DBMS</td>
<td>Non-standard</td>
<td>Hierarchical and Network model</td>
<td>Entity Relation model</td>
<td>Object oriented model</td>
</tr>
<tr>
<td>4</td>
<td>Import/Export</td>
<td>None</td>
<td>Limited</td>
<td>Standard</td>
<td>Fully integrated and seamless</td>
</tr>
<tr>
<td>5</td>
<td>Communication</td>
<td>Limited</td>
<td>Some interface</td>
<td>Standard</td>
<td>Full connectivity across the Web</td>
</tr>
<tr>
<td>6</td>
<td>Portability</td>
<td>Machine dependent and hardware specific</td>
<td>Machine independent but Platform dependent</td>
<td>Multi-vendor</td>
<td>Multi-vendor and Platform independent</td>
</tr>
<tr>
<td>7</td>
<td>Reports</td>
<td>Fixed format and limited fields</td>
<td>Fixed format and unlimited fields</td>
<td>Customized report generation</td>
<td>Customized report generation with e-mail interface</td>
</tr>
<tr>
<td>8</td>
<td>Capacity of record holding</td>
<td>Limited</td>
<td>Improved</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>9</td>
<td>Module Integration</td>
<td>None</td>
<td>Bridges</td>
<td>Seamless</td>
<td>Seamless</td>
</tr>
<tr>
<td>10</td>
<td>Architecture</td>
<td>Stand-alone</td>
<td>Shared</td>
<td>Client-server</td>
<td>Distributed</td>
</tr>
<tr>
<td>11</td>
<td>Interface</td>
<td>Command driven (CUI)</td>
<td>Menu driven (CUI)</td>
<td>Icon driven (GUI)</td>
<td>Web and Multimedia (GUI)</td>
</tr>
<tr>
<td>12</td>
<td>User Support</td>
<td>Single user</td>
<td>Limited number of users</td>
<td>Unlimited number of users</td>
<td>Unlimited number of users</td>
</tr>
<tr>
<td>13</td>
<td>Multi-lingual support/ UNICODE</td>
<td>None</td>
<td>Limited (through Hardware support)</td>
<td>Standard</td>
<td>UNICODE compliant</td>
</tr>
</tbody>
</table>

Table 1: Features of different generations of LMSs
3 Open Source Software: What is it?

The open source movement has been in conscious development for nearly two decades but the term "open source" itself has been a relative latecomer. Christine Peterson of the Foresight Institute proposed the term open source in late 1997 during a meeting of small group of open source movement key persons (Raymond, 2001). This group registered the domain name opensource.org, defined "open source,” developed Open Source Initiative (OSI) group, designed OSI certification, and created a list of licenses that meet the standards for open source certification. In the open source software development model the source code of software is made freely available along with the binary version so that anyone can see, change, and distribute it subject to the condition he/she abide by the accompanying license. According to OSI (Open Source Initiative, 2003a).

“Open source promotes software reliability and quality by supporting independent peer review and rapid evaluation of source code. To be certified as open source, the license of a program must guarantee the right to read, redistribute, modify, and use it freely”.

Analysis of definitions given by Chudnov (1999), Raymond (1996), Moody (2001), and Morgan (2002), identifies following attributes of OSS –

- OSS is typically created and maintained by developers crossing institutional and national boundaries, collaborating by using Internet based communications and development tools;
- OSS development process follows the famous Linus’s law – “Release early, release often and listen to users”;
- Quality, not profit, drives open source developers who take personal pride in seeing their working solutions adopted; and
- Intellectual property rights to open source software belong to anyone who helps to build it or simply use it and is not locked to any single vendor or institutions.

OSI set aside ten criteria (Open Source Initiative, 2003b) for a software product to be called open source software. OSI provides OSI Certified License to a software product if it satisfies following ten criteria (popularly known as Ten Commandments):

1. Free redistribution: The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources.

2. Source code: The program must include source code and must allow distribution in source code as well as compiled form.

3. Derived works: The license must allow modifications and derived works and must allow them to be distributed under the same terms as the license of the original software.

4. Integrity of the author’s source code: The license may restrict source code from being distributed in modified form only if the license allows the distribution of patch files with the source code for the purpose of modifying the program at build time.
5. No discrimination against persons or groups: The license must not discriminate against any person or group of persons.

6. No discrimination against fields of endeavor: The license must not restrict anyone from making use of the program in a specific field of endeavor.

7. Distribution of license: The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

8. License must not be specific to a product: The license must not be specific to a product.

9. The license must not restrict other software: The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

10. The license must be technology-neutral: The license must not contaminate other software by placing restrictions on any software distributed along with the licensed software.

4 Library Automation and Open Source LMSs

Use of open source library management software has manifold advantages. Chudnov (1999) identified three factors – fund, freedom and fraternity, which are advancing the use of OSS in libraries. These facilities are as follows - OSS licenses allow libraries to cut budget on software and use it to other areas that require more funds; OSS product is not locked into a single vendor. Thus even if a library uses an open source system from one vendor, it might choose to buy technical support from another company or get it from in-house experts; and the entire library community might share the responsibility of solving information systems accessibility issues. However, Mukhopadhyay (2005) identified following advantages in the use of open source software for library automation in India:

- OSS is an economical alternative to libraries' reliance upon commercially supplied software. It means that the real costs involved in the development, maintenance, and use of OSS software are lower than those associated with commercial software (license, upgrading and maintenance fees)

- OSS is essential if libraries are to develop software and systems that meet their patrons' needs. With OSS the IT infrastructure for library operations and services can be:
  - Open (that is, built according to open standards and as such potentially interoperable with other software and systems)
  - Ubiquitously available to libraries
  - Capable of being tailored to suit the needs and circumstances of individual libraries
  - Documented (and documentation is accessible to all)
  - Modified and corrected more effectively ("many eyeballs make bugs shallow")
- OSS ensures that library systems and online services will be more functional for patrons because libraries, through OSS movement, -
  o Are reinserted into the research and development process that results in new systems and software
  o Can share a stake in software development and thereby have greater influence over (and as a result take a greater interest in specification of) the functional and performance requirements associated with particular software tools and systems
  o Can motivate and empower systems librarians and related technical staff by encouraging creativity and positioning them to make a difference; and
  o Are able to collaborate more easily with experts of other similar domains engaged in common research and development activities

- OSS democratizes the use of software applications in libraries irrespective of the type or size of the library

5  Koha: The First Open Source Library Management Software

Koha is an integrated library management system that was originally developed by Katipo Communications Limited of Wellington, New Zealand for the Horowhenua Library Trust (HLT), a regional library system located in Levin near Wellington. The name Koha has taken from Maori (a tribe in New Zealand) language. The term Koha in Maori means *unconditional gift*. In 1999, Katipo proposed developing a new system for HLT using open source tools (Perl, MySQL, and Apache) that would run under Linux and use Telnet to communicate with the branches. The software was in production on 3 January 2000, and released under the GPL for other people to use in July 2000. There has been a high level of interest in Koha internationally, and it is currently being used in New Zealand, Australia, Canada, United States, India, Thailand, United Kingdom, and France. Many of the libraries presently using Koha are small and medium sized, mainly school, public and special libraries. The Koha project has attracted developers in a number of different countries, with release 1.2.2 being coordinated from Canada and the current stable release, 2.2.5 (available both for Linux and Windows), from France. The major features of Koha are:

- General: free to download, no license fees, fast, web centric, fully customizable, environmentally friendly (one can recycle those old PCs), establishing an international community of users and developers giving libraries the freedom to do it themselves or work directly with the system builders, generating an international spirit of co-operation and collaboration, easy staff training, supports both Windows and Linux platform, uses open source companions like Apache as web server, MySql as backend RDBMS and PERL as scripting language, supports web OPAC and web interface for staff, branches access main server via ordinary phone lines and modems, can run on PC grade or server grade hardware
- Circulation: issues (including rentals), renewals, returns and fines. Uses barcode scanners or keyboard; can generate a list of over dues for a phone reminder system
- Acquisitions: multiple book budgets and suppliers, real time budget information
- Catalogue updates fast and slick, support for MARC 21 and UNIMARC
- Searching by keyword, author, title, subject, class number or combinations, customize to suit need of individual library
- Memberships - one-stop-shop with all member information on one page
• User driven reservation facility from OPAC interface (Do-it-yourself reserves, in the Library or via the Internet)
• OPAC in the library or via the Internet and Stock rotation through branch libraries
• Work in progress: Z39.50 searching, Virtual Bookshelves, French and German versions, NCIP self checking, Port to other operating systems so that it will run natively, New themes, Additional book information (e.g. covers), Web based reports, Mozilla chromed OPAC integrated with Greenstone digital library system, Integration with Internet "gateway" system and bill to patron card, printing spine labels etc.

The Koha project uses a number of channels to allow members of its community to communicate with each other — there is a general mailing list, as well as separate ones for developers, Windows users, French-speaking Koha users/developers, and German-speaking Koha users/developers. In addition, the developers use Internet Relay Chat (IRC) for real-time scheduled meetings and conversations. Presently, there are three LMSs from the open source computing community, which have features and facilities of fourth generation LMS. These are Koha, PhpMyLibrary and Emilda. Koha is an advanced level Web-centric LMS and has many sophisticated features in compare with PhpMyLibrary and Emilda such as full support for MARC 21 and UNIMARC, Z39.50 client, Zebra server, extensive report generation utility, barcode based circulation, control of access privileges, branch library management etc. (Mukhopadhyay, 2005). A comparative study of Koha with commercial LMSs available in India shows that Koha supports almost all the required core activities of library management (Table 2).

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Core Services (1 indicates presence and 0 indicates absence of service)</th>
<th>Alice for Windows</th>
<th>BASIS Plus &amp; TECHLIB Plus</th>
<th>KOHA LIBSYS</th>
<th>SOUL</th>
<th>SLIM 21 ng-TLMS</th>
<th>Virtua ILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ACQUISITION</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>CATALOGUING</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>CIRCULATION</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>OPAC &amp; WebOPAC</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>SERIALS CONTROL</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>BIBLIOGRAPHIC FORMAT SUPPORT</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>DATA EXCHANGE FORMAT SUPPORT</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>COMMUNITY INFORMATION</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>RETROCONVERSION</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>STANDARD REPORT/ADMINISTRATION</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL NUMBER OF SUPPORTS</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 2: Koha and Commercial LMSs
6 Customization of Koha for College and Public Libraries in West Bengal

The facility of customization truly characterizes open source software. Koha has tremendous possibility in automating college and public libraries in India. This section deals with the customization of Koha for use in college and public libraries in West Bengal. In West Bengal, most of the college and public libraries require facility to process, store and retrieve Bengali script based documents. Apart from this necessity public libraries require Bengali script based user interface and both types of libraries need export and import facility of Bengali script based documents in ISO-2709 format. Commercial LMSs with these features and facilities are available in India but with an exorbitant price tag (e.g. Virtua ILS starts from Rs. 10 Lakhs). Keeping in view all these facts, a project on customizing Koha has taken by the author to support the abovementioned requirements of public libraries and college libraries in West Bengal. The first problem encountered in this endeavour is that the Koha is not Unicode-compliant. Although all the software required to run Koha (Apache, MySQL, PERL) allows universal character set, Koha itself is not Unicode compliant and therefore Koha source code requires to be modified to allow processing of Bengali script based information objects. This problem is solved through the development of a Unicode-compliant and Bengali script based theme for Koha. This theme can be installed separately over the top of regular Koha installation. Administrator of library automation system (or Koha) can configure Koha easily to use this theme (named as psm_koha). Change of this theme to the default theme of Koha is the matter of a click. It means any time administrator can roll back to the default theme of Koha. The features and facilities of Koha in Bengali are demonstrated under different sub-sections.

6.1 User Interface

Users of library automation systems may be categorized into two groups – end users and power users. End users access OPAC, search and retrieve documents, place reservations and access other available services.
Whereas power users configure automation system, place orders, catalogue documents, circulate library stock and perform other administrative operations. Obviously, library professionals belong to the power user group. The Unicode-compliant theme of Koha provides Bengali script-based interfaces for the both the groups of users. The OPAC along with some other utilities is demonstrated here as Fig. 1 and librarian interface of Koha is shown here as Fig. 2.

![Image of Librarian Interface in Bengali](image)

**Fig. 2: Librarian Interface in Bengali**

### 6.2 Cataloguing

Koha supports both MARC 21 and UNIMARC bibliographic formats. Administrator has to opt for the required bibliographic format at the time of installation of Koha. It allows designing separate formats for different library materials like monographs, serials, conference proceedings etc. on the basis of standard bibliographic data formats like MARC or UNIMARC. The concept is quite similar to the development of any number of worksheets from the same FDT in case of CDS/ISIS or WINISIS database management system. The theme allows processing of Bengali script based records through the use of virtual keyboard, open type fonts and required rendering engine (all these required tools for processing Bengal script based documents are available as open source software (Fig. 3 shows cataloguing of a Bengali book by using MARC 21 format). Apart from supporting multilingual document processing, this theme extends support for plug-ins to manage Leader, Control, and Number & Code fields in the data entry framework on the basis of MARC 21 bibliographic standard. The plug-in programmes (PERL script based programmes) helps in achieving standardized data entry activities through an easy to use interface.
6.3 Search and Display

The theme, as it is based on Universal character set, supports multilingual searching, browsing and display. Searching of Bengali documents is facilitated through the use of an array of FLOSS based tools like Avro virtual keyboard, open type fonts for Bengali script (e.g. Likhan, Bangla, Akash, Ekushey etc.) and USP10.dll rendering engine for Indic scripts (Ekushey Project, 2005; Chandrakar, 2002).
The search of documents and retrieval of results in Bengali script are demonstrated through Fig. 4 and Fig. 5 respectively.

6.4 Other Operational Activities

This theme also supports all other regular library activities like acquisition, circulation, report generation, member management, control activities, export/import, authority file maintenance etc. The circulation panel, as generated by the theme, is demonstrated here as Fig. 6.
6.5 ISO-2709 based Export and Import

A multilingual library automation system should not only support interfaces, processing, search and retrieval of multi-script documents but needs to ensure ISO-2709 based export and import of multi-script records to support exchange of bibliographic data across different library systems. This theme also ensures ISO-2709 based export and import of MARC 21 formatted bibliographic records (Fig.7 exhibits exported file in ISO-2709 format).

Fig. 7: ISO-2709 formatted Export of Bengali script based Documents

7. Conclusion

Open source software movement may change the way we use and apply software solutions for various library activities. The spirit of the five laws of library science guide us in developing open access to recorded knowledge and the ten commandments of open source software encourage us to design digital solutions for dissemination of knowledge to all, from anywhere, at anytime and in any language. In fact the nature of library services and philosophy of open source software are naturally fit. Library automation in India is so far restricted in university, research, special and big college libraries. In a large country like India, scale of implementation is a big factor in achieving success. Automation of only a few resourceful libraries is not going to lead us anywhere. It is the high time to change our mindset and overcome our dependencies on commercial LMSs. Open source LMSs can help us in developing low-cost library automation solution for an array of not-so-fortunate libraries and can benefit a large section of the society served by public libraries in different parts of the country. Lastly, we should remember that technology does not determine change – humans do.
References


Cite this paper as below: