

# Library Automation Software & Open Source Software

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**Abstract— Automation of library services and the use of open source software are essential for efficiency of information retrieval by systematizing and mechanizing the workflow. Library automation benefits both the library staff and the users. It reduces the level of job stress on the staff and enhances remote and timely provision of up-to-date information to the users. The objective and purpose of automation should be clearly reviewed before going for any automated information management system. Hundreds of software packages are available in the market that supports comprehensive automation of libraries. Normally automation software integrates activities such as administration, acquisition, circulation, documentation information retrieval and report generation.**

**Index Terms— Library automation, Open Source Software, Library effectiveness, OPAC**

## I. INTRODUCTION

Automation is a process of using the machineries for easily working and saving the human power and time. Computer system can produce in different formats for integrated systems and networked operations. Systems have to be upgraded or replaced to ensure sustained and effective functioning of the automation system. According to Lubanski (2012) automation simply means "the use of machines or technologies to optimize productivity in the production of goods and delivery of services". Aina (2004) opined that automation involves the computerization of routine tasks hitherto being performed by human beings. Library automation therefore is a process of applying or utilizing ICT facilities to perform those tasks that are traditionally performed manually in the libraries such as acquisition, cataloging, circulation, serials management, etc. Library automation requires the utilization of hardware and software.

According to Ukachi (2012) the advent and development of Open Source Software in the present age, has made the transition from "traditional" to "technology based" library services, which gives room for more efficient service provision, very easy and cost effective hence, libraries are now adopting them in their technical services, digitization processes, and general library management.

## II. HISTORICAL BACKGROUND OF LIBRARY AUTOMATION

It is necessary to know the historical background of automation. Automation of library has passed through several of development. It can be divided into 3 phases:

### A. Experimental Phase (1930-1960.)

The first application of automatic data processing equipment's in libraries can be traced back to 1936 when the University of Texas adapted a mechanical system for its circulation function. In the first half of the 20th century, i.e. in the early 1960s library automation began especially in the U.S.A. after the World War II.

### *B. Local Systems Phase (1960-1970).*

This period was applied for general purpose of digital computer for retrieval of information. In this era, the computers were applied offline. Many librarians made use of the computer as a tool in the organization of many of the library's procedures. Library activities like acquisition, cataloguing and circulation process that it became significant in initiating a trend.

### *C. Cooperative Systems Phase (1970- )*

In the 1970s there has been an increase in library cooperation and resource sharing by libraries developing computer based systems. Magnetic tapes and floppy disks were used for storing information. In the 1980s there was intensive use of online systems networks, optical disks, CD-ROMs etc. In this period, microcomputers came to be used in libraries. Recently Internet is well integrated for National and International library networks.

## III. REVIEW OF LITERATURE

Automation of different types of libraries is found to be conducted by different researchers in various parts of the world as the following review shows. Henry (1997) had discussed the challenges and opportunities involved in automating library illustrating with examples of what American libraries have accomplished and what may be the word of warning for Indian libraries. The study also highlighted that Indian libraries are facing difficulties at a time when financial resources are dwindling and the costs of automated system are increasing

Dilroshan (1998) studied the problem of selected two university library namely University of Moratuwa Library (UML) and University of Colombo Library (UML) in the process of their automation by using a survey research method. The study discussed staff issues, managerial and financial issues etc. and highlighted their most common and often encountered problems like power failure, outdated hardware, customizing software difficulties in training the staff, etc. The same also put suggestions to overcome the problems and put recommendations for future course of action.

A study was conducted by Kumar (2003) regarding automation in five university libraries of Haryana. The study had revealed that the automation activities were initiated in the university libraries a decade ago but none of them shifted completely over to the automated system. The finding shows that interaction between staff should be established and more infrastructures are needed in majority of the libraries. Pandey (2003) investigated some of the experiences and problems faced by Kamala Nehru College Library in its Automation. The same has explored that the college was in need of more hardware like micro computer, selection of right application software and was facing financial problem. The study rightly pointed out that software programmers have to be considered as tools that help to solve problems rather than as 'solution' to problems. Different software like CDS/ISIS, LibSys, Techlib+Oasis, Suchika, TLMS, NETLIB etc. were also discussed and compared to find out suitable one for the library automation.

Sameni and Muhammad (2003) discussed the initiatives taken up by the University in Bangladesh to automate the library with the help of customized library software "library management system". Four modules of software are discussed in detail in the study. It also highlighted the situation of academic libraries and problems faced in automating the libraries. The study put suggestions to the UGC of Bangladesh to follow the initiative taken up by INFLIBNET under UGC of India towards automating academic library system. Kumar (2004) had conducted a case study of automation in Tura campus library, Northern Hill University. The study highlighted about the selection of hardware, software and training of library staff for the automation of a library. It also evaluated automation work of the Library and enumerated various problems faced by the library professionals during automation.

In the planning and management for library automation Sahu, Nageswaran and Singh (2005) described the basic elements of managing the automation planning process in primarily special and R & D libraries. They provided a detailed overview of a planning process designed to help to make decisions about library automation. The study also suggested that a library should conduct a major re-examination of its plan every five years, and review the same on an annual basis. Bansode and Peiera (2008) had conducted a survey on library automation in college libraries in Goa to find out libraries that have undertaken automation, areas of automation, whether sufficient staff is available to carry out automation and barriers to automation faced by the libraries. The study have thrown the light that majority of the college libraries have no qualified librarians as per UGC guidelines. Of the 23 libraries with automation, as the findings show, only one has specialized

staff in ICT. The study also suggested that library staff should be sent to training courses to upgrade their IT skills, so that they can become competent to automate their libraries.

Shivpal Gautam and Ritu (2008) studied open source solutions and their impact on areas of information, knowledge and content management. It highlighted library community the concerned areas in library automation and discussed about automation product such as commercial, not for profit and open source. The study also highlighted features of library automation software, which are mostly in practice by libraries i.e., Libsys, SOUL and open source system KOHA. Ahmad (2009) studied on Library Automation of Al-Barkaat Institute of Management Studies, Aligarh with the help of Alice for Window (AFW) Library Software. The study found that ABIMS Library was the first fully automated library among all self-financing Institutes available in Aligarh, which has provided, Online services to its users through Inter Library LAN System in which users can access the library database from the Online Public Access (OPAC) and also help to library staff to provide good reference service to staff and students.

Jayaprakash and Balasubramani (2011) in their study had emphasized that automation of library operations and services were essential for efficient functioning of the library and saving the library users' time. In this purview, the study investigated the Automation in University libraries in Tamil Nadu. It discussed automation, its need and application in university Libraries. The study explained the various problems faced by authorities and the staff during the process of automation. The tool adopted to conduct the study was a well-structured questionnaire.

#### IV. MEANING OF AUTOMATION

The word "automation" has been derived from Greek word "automose". The term "automation" was first introduced by D.S. Harder in 1936. He used the term automation to mean automatic handling of parts between progressive production processes.

According to Webster's Third New International Dictionary of English Languages, automation is "the techniques of making an apparatus a process or a system operate automatically". According to Encyclopedia of Library and Information Science, "automation is the technology concerned with the design and development of process and system that minimize the necessity of human intervention in operation". According to McGraw Hill Encyclopedia of Science and Technology it defines automation as "a coined word having no precise generally accepted technical meaning but widely used to imply the concept, development or use of highly automatic machinery or control systems".

#### V. MEANING OF LIBRARY AUTOMATION

Library automation implies a high degree of mechanization of various routine and repetitive tasks to be performed by human beings. With the advent of automation, the human intervention is reduced to a great extent. The appearance of computer has greatly increased the library automation. In addition to computer advancement, telecommunication and audio-visual technologies gave way to new possibilities in information handling. In India the use of computers is limited to only some specialized libraries unlike the case of developed countries. Library automation includes use of computers and other semi-automatic devices like punched cards to reprography. These are semi-automatic because human intervention is greater in extent. So when we talk of library automation, these days, it is principally the use of computers.

#### VI. DEFINITION OF LIBRARY AUTOMATION

Library automation may be defined as the application of automatic and semiautomatic data processing machines (computers) to perform traditional library house-keeping activities such as acquisition, circulation, cataloguing and reference and serials control. Today "Library Automation" is creation of Database Management systems.

#### VII. TRADITIONAL METHODS FOR HANDLING INFORMATION ARE INADEQUATE

This age is termed as the 'information age' because large amount of information is being generated every moment. This information which is generated is stored and retrieved in a library which is used by the users. There are various methods of handling of information like providing reference service, circulation,

cataloguing etc. These traditional methods of handling information have become inadequate and hence automation is necessary.

#### VIII. ADVANTAGES OF LIBRARY AUTOMATION

Many activities of a library are routine in nature, a few are repetitive. Automation provides library's resources in a better way but at the same time saving time, money and manpower. For example, once the bibliographic details like author, title, edition, publisher, price, ISBN number, etc are entered at the time of ordering, the same data can be used for accessioning, cataloguing (OPAC), and circulation. Other important factors associated with automation are speed, and accuracy. One can imagine the time saved in literature searches and in preparing bibliographies.

#### IX. CAREFUL SELECTING RIGHT SOFTWARE

While implementing the Fed Solutions (2012) listed 10 criteria for selecting the right software for an organization. These criteria are as follows:

- What is the need for this application software? Identify the purpose for which you need the software. Example: having a need for an integrated tool that would allow a group of up to 30 researchers to gather authenticate and report their study data.
- Identify your priorities: It is important to understand the capabilities of the various products and how they can benefit your organization
- Mission Critical vs. Business Critical: What is the mission? Is it a mission critical or business critical application? A mission critical use is serious to the operation of your business. If the application flops or is inaccessible within a certain length of time, it could be damaging to your business, such as financial software errors. A business critical application is critical for your personnel to perform their obligations and responsibilities. A credible vendor should be able to enlighten you on this.
- Vendor Credibility and Longevity: It is important to know the vendor's history and credibility. What are their customer dependability and satisfaction ratings? Don't focus completely on the negative aspect but be analytical. A solid warranty is something to look out for and ask about.
- Software Reliability: Are there any issues with the software going offline or any technical glitches? What is the length of time for issues to be resolved? Does the time slot given to resolve issues fit in line with your activity? Research online forums and even make a call to other customers to get a realistic idea of what you're really getting yourself into.
- Scalability for Growth & Pricing: Will the application be beneficial as your organization grows? Will there be an increased pricing if your organization grows? Ask questions to know if there will be license issues when adding users. The pricing should reflect and support the capabilities, measuring up to the level of support offered.

#### X. IMPLEMENTING OF LIBRARY AUTOMATION

Library automation refers to the use of computers in the routine and important services of a library. Automation of a library has mainly two components, viz. computerization and networking. Computerization will help a library to modernize its in-house operations while networking will allow it to access other libraries for the exchange of information.

#### XI. LIBRARY AUTOMATION COMMITTEE

It should be constituted to include library and computer software/ hardware experts. A list of the library's areas of activities, services and functions which are to be automated should be prepared. It is advisable to note that the experiences of the other librarians who have used the software are more valuable than the assurances of the manufacturers. The flexibility, capacity, expandability, security, cost effectiveness, user's friendly, module based and ability to be updated with the latest technology capability of the software should be prioritized when selecting a software.

Open source software are as follows: i) User friendliness ii) Portability iii) Well designed screens, logically arranged functions with extensive help messages iv) Minimal training v) Multi-user and unlimited user

access vi) Multilingual & Multimedia supported vii) Supporting Internationally known standards (MARC, AACR-2, Dublin core, Z.39.50, etc) viii) Training and Support (E-mail, Discussion Forums) ix) After installation service availability and, x) Cost of installation Characteristics of Open Source Software that qualify them to be effective library automation software.

## XII. BENEFITS OF USING OPEN SOURCE SOFTWARE

Numerous benefits support cost effectiveness, interoperability, user friendliness and the ability to modify the software to suit any specific function desirable by the user, can be derived from the use of Open source software. Moffat (2006) stated that one of the main benefits of open source software is the commitment of the community to develop something that is interoperable and respects open standards. Tennant (2007) reported the growth of open source technology that it is flexible and has the ability to build a complex system at less cost. Clark (2008) affirmed the advantage of open source in terms of saving money on a library system and for support costs. Gonzalez-Barahona (2000) stated that the benefits associated with the use of Open source software range from philosophical and ethical reasons to pure practical issues. He summarized the practical benefits as follows:

### A. Reliability

Users of the software can decidewhether to use the unofficial fix or wait for an `official' version. By `official' that we mean a release blessed by the project team itself or a trusted authority such as one of the main distributors of Open Source packages.

### B. Stability

The vendors need a stable revenue stream which is able to keep their business going .Their customers have not the slightest desire to change or upgrade any product that is working well enough to suit their needs.

### C. Auditability

A rarely-understood benefit of Open Source software if it is any software where the source code is published then it is its auditability. By publishing the source code, authors make it possible for users of the software to have confidence that there is a basis for those claims.

### D. Cost

Open Source software offers its users greater freedom to purchase other products, avoiding lock-in to particular manufacturers. Quite a number of open source software is available for automating the various library functions.

A few open source software are available for integrated library management

### A. Koha Software

Koha software runs on the Linux operating system in conjunction with the Apache Web server, uses the popular MySQL open source database management system and is written in Perl. The software is available at <http://www.koha.org> while the Mailing list URL is: <http://koha.org/ mailing/>.

### B. Evergreen Software

This is an open source Integrated Library System (ILS). It includes circulation and cataloguing features, OPAC, SIP2.0 support for interaction with software administrator and search/retrieval through Z39.50. It operates on Debian or Ubuntu Linux servers. It is operable in English and issued under GNU General Public License (GPL) Evergreen software features include: Circulation, Cataloging, on line public access catalog-OPAC, and Acquisitions.

### C. ABCD Software

ABCD, which in full is, “Automation of libraries and Centers of Documentation” is operable in English. The name itself already expresses the ambition of the software suite to provide not only automation functions for traditional libraries but also other information providers such as documentation centers.

#### *D. WinISIS(formerly CD/ISIS)*

Win ISIS is a Windows version of the CDS/ISIS system (Computerized Information Service /Integrated Scientific Information System) which was developed because CDS/ISIS was not compatible with the WINDOWS operating system. It originated at ILO and is developed by UNESCO.

#### *E. NewGenLib*

NewGenLib version 1.0 was released in March 2005. On 9 January 2008, NewGenLib was declared Open Source Software under GNU GPL. The latest version of NewGenLib is 3.0.4 R1 released on 13 September 2012. According to Haravu (2009), NewGenLib has the following main modules: Acquisitions, Technicalprocessing, Serialsmanagement, Circulation, and Administration

#### *F. Emilda*

This is a complete Integrated Library System that features amongst others OPAC, circulation and administration functions, Z39.50 capabilities and 100% MARC compatibility.

#### *G. PMB (PhpMyBibli)*

This is a fully featured open source integrated library system. It is maintained by PMB Services -French Company. PMB has most of the functional modules essential for a library management system. The available modules in this software include: Circulation, Cataloguing, Reports, SDI (Selective Dissemination of Information Service) and Administration, and Acquisition.

#### *H. WEBLIS*

This web-based Integrated Library System is based on CDS/ISIS. It is developed by the Institute for Computer and Information Engineering (ICIE), Poland, based on their experience in building library systems for international organizations such as FAO, IFAD and GTZ. WEBLIS runs through the WWW-ISIS engine. The current version of WEBLIS is available in English.

### XIII. GROWTH OF LIBRARY AUTOMATION THROUGH CONSECUTIVE YEARS

- Kaul (1999) has given the growth of library automation can be better understood from the following table:
- 1940-1949 Semi-mechanical applications including edge-notched cards, optical coincidence, peek-a-boo cards.
- 1950-1959 Use of punched cards, data processing equipments, early computers and micro image searching systems.
- 1960-1969 Application of general purpose digital computers, feasibility studies of online interactive and advance micro image systems, experiments in library networking.
- 1970-1979 Design of online systems and conversion of batch systems into online mode, growth of library network and databases.
- 1980-1989 Intensive use of online systems, networks, mini and microcomputers, optical disks, CD-ROMs, FAX etc
- 1990s Use of internet and library networks aims towards higher levels of computer application such as recording through electronic media, artificial intelligence

### XIV. DIFFERENT TYPE OF SOFTWARE PACKAGES

Mahapatra & Ramesh (2004) has given the following table provides a list of different software's packages used for automation and the name of their manufacturing companies.

S.no	Name of the software	Manufacturer	Place
1	ARCHIVES	MIFIFAX Electronics Ltd.	Mumbai
2	CDS/ISIS	UNESCO	Paris
3	DELSIS	Libsys Corporation	New Delhi
4	GRANTHALAYA	NISCAIR	New Delhi
5	LIBMAN	Datapro Consultancy Service	Pune
6	LIBRIS	Frontier.I.T. Pvt. Ltd	Hyderabad
7	LIBSUITE	Softaid Computer Pvt. Ltd.	Pune
8	LIBSYS	Libsys Corporation	New Delhi
9	MAITRAYEE	CMC Ltd.	Kolkata
10	NEWGENLIB	Kesavan Ins. Of Information and Knowledge Management	Hyderabad
11	MINISIS	International Development Research Centre	Canada
12	OASIS for DOS.	Softlinkpvt	Australia

## XV. COMPONENTS OF A FRAMEWORK

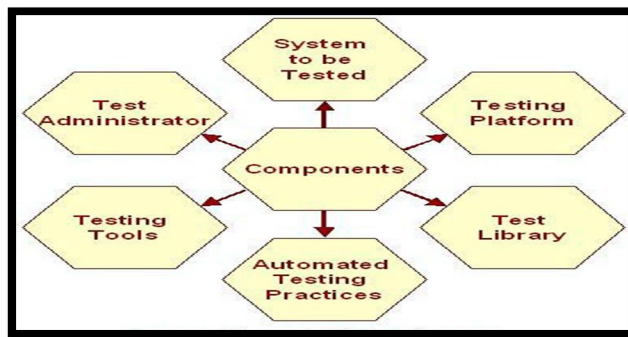


Figure-1

### A. System to be tested

The subsystems of the system are to be tested and must be stable and otherwise test automation will not be cost effective. All the subsystems must be stable and work together as a whole before the start of an automation test project.

### Testing platform

The testing platform and facilities is the network setup on which the system will be tested. It must be in place to carry out the test automation project.

### Test case library

It is useful to compile libraries of reusable test steps of basic utilities to be used as the building blocks of automated test scripts. Each utility typically performs a distinct task to assist the automation of test cases.

### Automated testing practices

The procedures describing how to automate test cases using test tools and test case libraries must be documented. A list of all the utilities and guidelines for using them will enable us to have better efficiency in test automation.

### Testing tools

Different types of tools are required for the development of test scripts.

### Test administrator

The automation framework administrator has to manage test case libraries, test platforms, and test tools maintains the inventory of templates. Provides tutorials and helps test engineers in writing test scripts using the test case libraries. Provides tutorial assistance to the users of test tools and maintains a liaison with the tool vendors and the users.

## XVI. LATEST TRENDS TO BE CONSIDERED FOR LIBRARY AUTOMATION

1. Integrated library Management system: An automation system in which the various applications share one bibliographic database. 2. Core modules as: Circulation, cataloguing and online public access catalogue are necessary minimums. Additional modules include acquisitions, community information, course reserves, imaging, inter-library loan (ILL), materials booking and serials. Acquisitions and serials are sometimes part of the same module and are often part of the core package, content management, e-learning etc. 3. Client-server architecture: Turnkey systems are quickly becoming a thing of the past. A client/server system is identified by a more powerful server machine that handles database manipulation and retrieval while leaving the user interface to the desktop client software. 4. Z39.50: This is a protocol for computer-to-computer information retrieval. 5. GUI interface for all modules: Graphical and menu-driven interfaces have or are replacing command driven interfaces in systems. 6. MARC 21 and non-MARC compliance: First, library systems developed to use MARC records. Now systems must allow for cataloguing formats, such as Internet resources, for which no MARC formats yet exist alongside MARC records. 7. Web-based patron catalogue: Patron access is greatly increased when catalogues can be accessed remotely via the World Wide Web. 8. UNICODE: This protocol expands the character set allowed and is essential for collections with materials in non-Roman languages. 9. RFID (Radio Frequency Identification Technology): RFID is the latest technology to be used in library theft detection systems.

## XVII. CONCLUSION

Library automation and the use of open source software are relevant for achieving optimal library effectiveness at a minimal cost. This process benefits both the library staff and the users as it reduces the level of job stress on the staff. It enhances remote and timely provision of up-to-date information to the users. This paper opines out the salient issues that should be considered in library software selection for effective library automation software. Library automation is the only solution to acquire, maintain and discriminate the resources effectively. Owing to emerging technologies, it is advisable to give proper training, brainstorming sessions for library staff members to use the library automation database effectively which are boon for us.

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