

**DEVELOPING AN INTEGRATED LIBRARY SYSTEM (ILS)
USING OPEN SOURCE SOFTWARE
KOHA**

**A Thesis
Submitted to the School of Engineering and Computer Science
Of
BRAC University
by**

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Summer 2009**

DECLARATION

I hereby declare that this thesis is completely my own work. Materials, which I used my project found by web site, are mentioned by reference.

Signature of
Supervisor

Signature of
Mohibuzzaman Zico

ACKNOWLEDGMENTS

I would like to thank my thesis supervisor Dr.Mumit Khan for supervising my whole project all the time. Speical thanks goes to Mrs. Hasina Afroz, Head of the Library, Ayesha Abed Library for her constant help. It will be incomplete if i don`t mention our ILS Team of Ayesha Abed Library. Credit also goes to them. They helped me a lot form the very begining of this project.

ABSTRACT

I want to implement a powerful and flexible integrated library system, supporting the academic, research and administrative needs of all academic members including students & faculty. Here, I am going to use KOHA, which is an open source software. And, after some research on KOHA, I became to know that, KOHA has the capability to improve the quality, speed & effectiveness of this service. In one word, I want to develop a system which will provide a barrier-free, timely access to the information resource of the BRAC University as well as gateways to national and international resources.

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CHAPTER 1

INTRODUCTION

1.1 What is an ILS?

According to UNESCO:

ILS is "an automated library system that is capable of managing the operations of more than one basic library functions" Integrated library management system is a system which can keep all tracks of a library operation such as items, billing, tracking various items owned by library like books, journals, magazines, dvds & so on, orders made by various faculty staff & students and also even patron management. By this system any library can operate all the library operation easily and centrally. ILS can connect various libraries together including their various branches. ILSs were known as "library management system" or "automated library system". Before any automated library system, libraries usually used a card catalog to index its books and others. After some days, computer were used to automate this card cataloging and then it became to known as "automated system". But, as the internet is getting stronger & libraries are demanding more and more automated facilities, new and powerful ILSs started developing by various companies. These new ILSs are consists of many functionality based on internet.

Today's ILS softwares can do various tasks at a time, as for example. Acquisitions, cataloging, tracking newspapers and magazines and others. And, most of the jobs are web based. Any authenticated user can operate these software from anywhere of the world. That means, major ILS systems now offer web-based portals where library users can log in to view their account, renew their books, and be authenticated to use online databases. In any Integrated library system there are generally two interfaces, one is for patrons and another is for administrators. In library system the operation of a user/member/patron and staff of library is different. A user can search a book, view available book list ,can issue book, renew book, can hold book, can print issue list, can edit his/her information (patron information). But a staff can store bibliographic (book, CD, DVD, journal etc) record actually library materials record in database, can create patron in database, order a book, purchase a book, can check the price list and others.

Basic features of an Integrated Library management System:

1. Functional Modules (as per requirement)
Basic Modules: Acquisition, Cataloging, Circulation & OPAC
Add on Modules: Serial Control, Interlibrary Loan (ILL) and Web OPAC etc.
2. Operating system:
Preferably Linux and Windows environment
3. Database system:
MySql, Oracle, Informix etc.
4. User Interface:
Graphical User Interface (GUI)
5. Library Automation standards:

A compatible standards such as MARC and Z39.50 protocol

1.2 Various Integrated Library System softwares:

There are many ILS softwares there in the market. Both open source and proprietary.

1.2.1 Some proprietary good quality ILSs are:

- Products from The Library Corporation - TLC
-
- LS2
-
- Library. Solution
-
- Carl. X
-
- Products from SirsiDynix - Dynix
-
- Horizon from SirsiDynix (Discontinued)
-
- Symphony from SirsiDynix
-
- Unicorn from SirsiDynix
-
- Products from Ex Libris
-
- Voyager (formerly from Endeavor)
-
- Aleph

Prices of some proprietary ILS:

Name	Approximate Price
Libsuite	\$9000
LibSys	\$9000
SOUL	\$1000
ALICE for Windows	\$7000

1.2.2 Some open source good quality ILSs are:

- BiblioteQ
-
- Evergreen
-
- Koha
-
- NewGenLib
-
- OpenBiblio
-
- PMB
-

1.3 Requirement Analysis of Library System:

The very basic requirements of a modern Integrated Library System (ILS) are stated below:

1. Acquisition
2. Cataloguing
3. Online Public Excess Catalogue (OPAC)
4. Circulation
5. Serial Control
6. Management or Report
7. System maintenance Facilities or System Parameters

Now, some explanation of the above points:

1.3.1 Acquisition: – Activities related to obtaining various library materials by purchase, exchange, or gift, including pre-order bibliographic searching, ordering and receiving materials, processing invoices, and the maintenance of the necessary records related to acquisitions.

The following requirements are under the acquisition: -

a. Selection of items: What kind of books, CD, DVD etc want to a staff buy for a library .For books it could be hardcopy, softcopy or original copy.

b. Duplicate checking: A staff can find duplicate checking from this option.

c. Selection of vendor: A staff of a library can choose a vendor to purchase a book. Various vendor lists are included here, so that, staff or purchase officer of the library can choose his/her favorite and eligible vendor from the list.

d. Ordering: After choosing the vendor, ordering is done by the Library authority. Which is the purpose of this feature.

e. Receipting: From this option staff of a library can check if a book has arrived in library on time from vendor or not.

f. Claming: If vendor is unable to supply books on time, library can claim on that vendor.

g. Fund control: A fixed amount of money is assigned for particular department. And, with the "Fund Control" feature of ILS, this becomes very easy to control in library database.

h. Report and statistics: This feature create reports on books, journals, Cds, DVDs etc. Statistics made by ILS focuses on the usage of library materials by various users of the organization / educational institutions.

1.3.2 Cataloguing: -

a. Record creation: Record about books, CD, DVD etc in database in standard format say MARC 21 format.

b. Duplicate checking: A staff can find duplicate checking from this option. That means,one can compare two books whether they are same or not.

c. Record editing: A staff can edit information of the library materials.

d. Authority files: The computerized list of subjects, series, and name headings used in the online catalog.

e. Cataloguing copies: When a staff store the materials record in database there error could be occurred in data entry like call number of the book or edition number. This type of errors can lowered by using this feature.

f. Keyword: In an electronic index or database, keywords can be combined together using the Boolean operators like AND, OR, and NOT.

g. Import and Export data: Reports on which materials are imported from other library or exported to another one.

1.3.3 Online public axcess catalogue (OPAC): - An OPAC (Online Public Access Catalog) is the electronic card cataloging system to look up library resources, such as books,cds or others.

a. Normal search: Book search by keyword, title, author etc

b. Advanced search/Modify search/New search: Exact search means by author name or by book name.

c. Status inquiry: Information of a particular book for borrows. If it is not available then no one can borrow this book only can hold this book.

e. Print provision: After issuing a book patron can print issued copy from the software. KOHA is supporting this option.

f. Prompts and help messages: Actually this option help a patron to gather knowledge about software how the library operation works in particular software.

g. Personal account: A member of the particular organization can save his/her information in database in a with this software.

h. Online access: Any one can see or access software over Internet or Intranet.

1.3.4. Circulation: -

- a. Patrons and items files: Record about all the patron and materials of a library.
- b. Setting parameters (Issue, return etc): A single uniquely numbered or dated part of a periodical or newspaper.
- c. Fine and overdue notice: Material, which is not returned to the library by its due date, is considered overdue.
- d. Hold and recalls: A hold guarantees that when a book is returned to the circulation desk it will be saved for another user.
- e. Reservations: From this option we can know about a particular book which is available or reserve by some one in library.
- f. Renewal: An extension of the loan period for charged library materials. As long as no one else requests the book, renewals are unlimited. Renewals may be handled in person at a circulation desk, by phone, or through the online catalog.
- g. Short-term loans: If any book holds by more than one person the only book borrow for one week only.

1.3.5 Serial control: - Serials include journals, periodicals, magazines, almanacs, annual reports, numbered monographs, and other materials. This term is sometimes used interchangeably with "periodical."

Ordering, Receipting, Collecting, Claiming and Binding are included here. I talked about these before but only Binding. Here, Binding means, any library staff can bind the journal in a library to access easily.

1.3.6 Management: -

- a. Information :Information about the total library operation. If a staff needs any information he/she can gather various information with this option.
- b. Tools for the analysis of statistical information: Information about uses of books.

1.3.7. System maintenance facilities: -

- a. User interface: In software there is common interface for all user but some interface may varies based on user.
- b. Security of records and files: A library promise to all users that they keep their password, information and profile safe and secure.

c. Customization: We can customize each and every field in open source software such as KOHA.

All the above requirements are important for a complete integrated library management system.

1.4 SCOPES OF PROJECT

My main scopes are:

1. Implement a powerful & flexible integrated library system, supporting the academic, research & administrative needs of students, faculty & staff.
2. Improve the quality, speed & effectiveness of library service.
3. Convert data from the existing library systems into standard format, as for example: MARC 21; that will preserve and insure its continued development and preservation, as well as the ability to migrate data to new generations of library system.
4. Import data generated by the central student and personnel management information databases. This will enable the library with data to use as a basis for assigning user rights, hence improve the "library user" tracking activities.
5. Provide barrier-free, timely access to the information resource of the university library as well as gateways to national & international resources.

CHAPTER 2

KOHA - 3.0.1

2.1 Why I chose KOHA?

KOHA is an open source project. That means, its source code is open. Anyone can develop from anywhere of the world in any time. And, with the help of open source developers, now KOHA is known as the most powerful ILS of the world of Information & Library system. Moreover, KOHA has some advantages over other ILS. Some of the advantages of KOHA has been stated below.

1. *Full-featured ILS:* KOHA can be used in any kind of library. Big or small. It is a true enterprise class ILS with various features. Koha includes modules for circulation, cataloging, acquisitions, serials, reserves, patron management, branch relationships, and more.

2. *Dual database design:* KOHA uses two database design, which makes it more stable & industry standard. It supports both text based & Real time database management system.

3. *Library standards compliant:* KOHA is capable of the interoperability between Koha and other systems and technologies, while supporting existing work flows and tools.

4. *Web based interface:* KOHA has a very user friendly web based interface. And it is using all the cutting edge web technologies like XHTML, CSS & Javascript.

5. *No vendor:* Though KOHA is an open source project, so there is no vendor lock in here. That means, any one can participate & develop KOHA in any time.

6. *Robustness:* The public front-ends should be sufficiently stable to avoid a situation where a poorly done operation (badly formed query, etc) could bring down the system.

7. *Usability:* The online public access catalog (OPAC) had to be immediately useful to the walk-up patron.

8. *Basic performance:* The average query had to be handled quickly enough to meet expectations (while difficult to assign a metric, feedback on this would be continuous if this aspect was neglected).

9. *Downtime:* Business hours downtime had to be minimized. The collection management system is the principal application for circulation of materials, and if offline effectively cripples a library. However, after hours maintenance or clearing routines are generally acceptable, but 24 hour access to the catalog is preferable.

10. *Back office:* "Back office" needs had to be addressed: Almost no library collection is static, so performing

basic accession and de-accession operations needed to be supported. It is acceptable for these functions to require some initial training.

11. *Inventory*: Inventory vehicle and reporting system were needed.

12. *Book ordering*: HLT requested the inclusion of book-order handling, to simplify accessions and budgeting.

2.2 KOHA at a glance:



*Moari word, means, "gift" or "donation"

*License: The GNU General Public License

*Developer: Horowhenua Library Trust, New Zealand

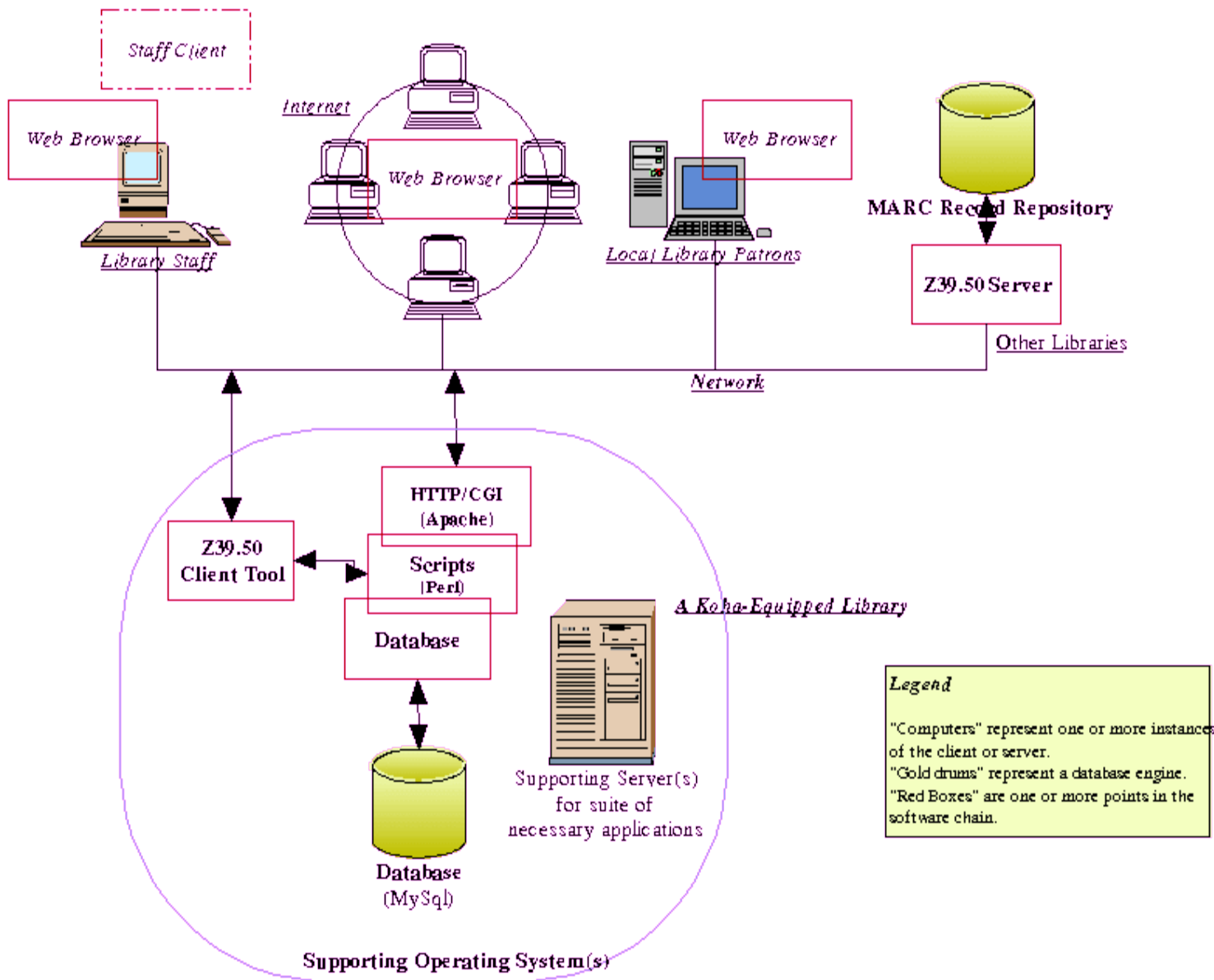
*Operating System: Linux, Windows

*Programming Language: Perl

*Functional Modules: Acquisition, Cataloguing, Circulation, Serial Control

2.3 Architectural overview of KOHA

Fig: 2.3.0.1 : architectural overview of KOHA system



2.3.1 Z39.50 Client-Server Component

Koha has the option of using a Z39.50 client (in client/server fashion) to retrieve MARC cataloging data from network accessible repositories.

2.3.2 Staff Client/Server Component

The original version of Koha included a non-Web based client for dedicated circulation activity, in part to make interface with barcode scanners simpler, as well as potentially permit coping with higher levels of traffic than the web front-end would make comfortable.

As of Koha's 2.0 series release, this component is effectively retired, as the web-based method has proved generally acceptable for circulation activities.

2.3.3 Koha Core

Koha's "core" is built around several different architecture components working in concert.

2.3.4 OPAC, Intranet HTTPD Client-Server Component

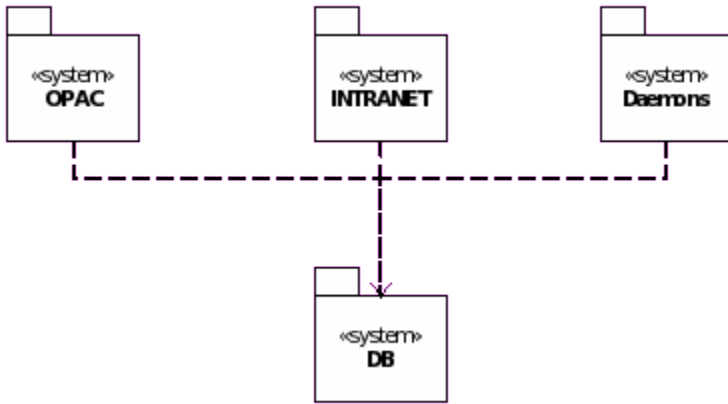
The Apache HTTPD server is the default tool supporting the heart of the Koha system -- a set of Perl scripts that are the buffer between the staffer or patron and the system back-end. These scripts-on-Apache and the web-browsers that display their results are in a client/server relationship, as are most web applications.

2.3.5 Perl Internals

Server side scripts are called via the CGI extension of the Apache HTTPD server. The scripts are all written in Perl. There are modules written in Perl that will access the database middleware. All HTML pages are generated by Perl scripts. There is a standard HTML Perl module that generates the HTML pages based on HTML Perl templates. It is almost like HTML JSP tags. There is a set of Perl modules for the Koha part of the system and a separate set of Perl modules for the Intranet part of the system.

The Perl scripts are provided in following four packages with following dependencies:

Fig: 2.3.5.1: perl script with four packages

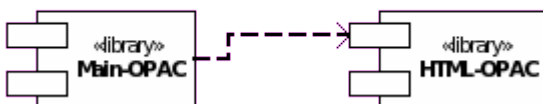


2.3.6 OPAC

OPAC is the patron (Koha) side of the system INTRANET is the back office and the front desk side of the system Daemons contains all the scripts for all the daemons in the system DB contains the scripts for accessing the database system

2.3.7 OPAC Components

Fig: 2.3.7.1: opac components

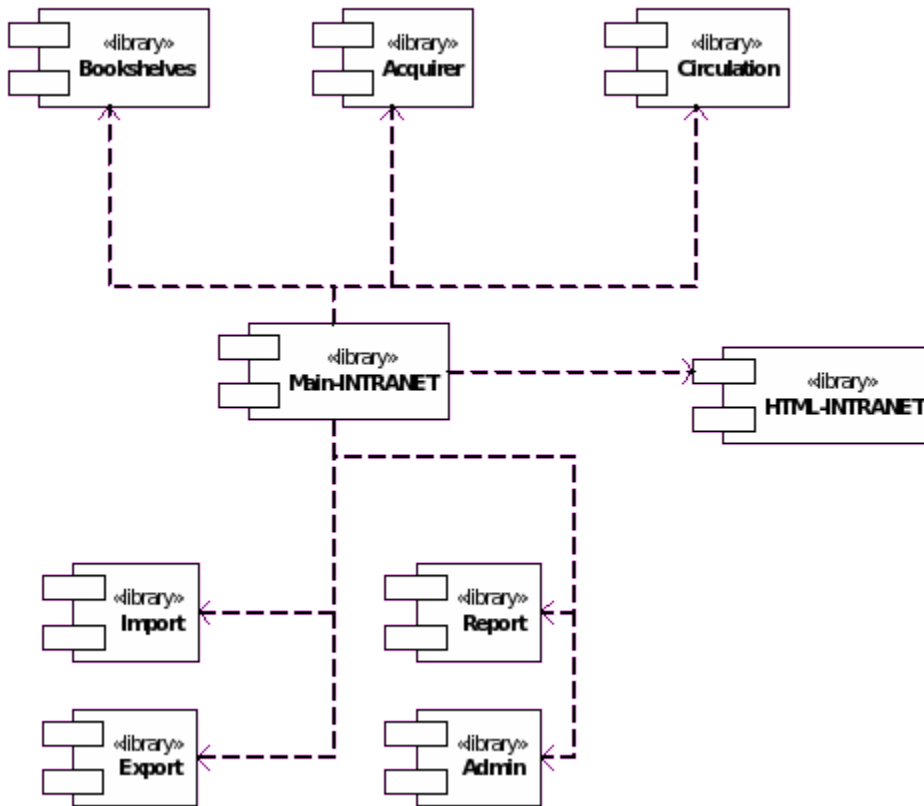


There are two components in the OPAC package.

The Main-OPAC contains all the Perl scripts and the HTML-OPAC contains all the HTML templates for all the HTML pages for the Koha part of the system.

2.3.8 INTRANET Package

Fig: 2.3.8.1: Intranet Components



There are 9 components in the INTRANET package.

The Main-INTRANET component contains all the main Perl scripts to handle the navigation, login, logout and provide connection to the other components.

The HTML-INTRANET component contains all the HTML templates for all pages for the INTRANET side of the system.

The Bookshelves component contains Perl scripts to define/describe the library's bookshelves.

The Acquire component contains Perl scripts to handle acquisition of books and other library material.

The Circulation component contains Perl scripts to handle library's circulation system.

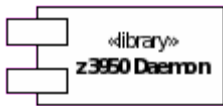
The Import and Export components contains Perl scripts to import and export data from the Koha system.

The Report component provide Perl scripts for generating reports.

The Admin component contains Perl scripts to configure and administer the Koha system.

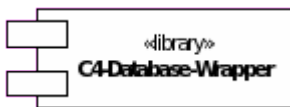
2.3.9 Daemons Package

Fig: 2.3.9.1:Daemons Components



2.3.10 DB Package

Fig: 2.3.10.1: DB Components



The C4-Database-Wrapper provides Perl scripts for accessing the data in the database.

2.3.11 Database Middleware Component

The Perl DBI libraries is used as the middleware to handle connectivity to instance of MySQL. This is a standard third-party Perl module.

2.4 Analysis of Existing Framework(s)

The dominant Koha architecture is based on client/server architecture using a thin client Web browser connecting to a HTTP server. The server is architected based on a middleware architecture, where the Apache HTTP server and the Perl scripts are the middleware connecting to a database implemented using MySQL.

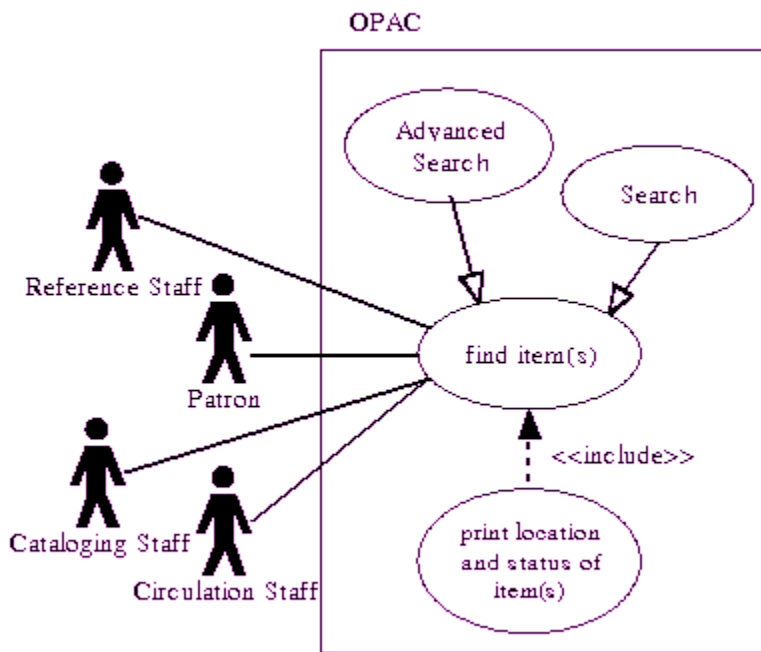
One of the questions to answer is how scalable is the architecture. Based on the client/server and the middleware server approach, the architecture should be scalable from small systems to mid size systems, however this has not been quantified in any requirements.

The uses to which Koha is put have helped shaped the architecture more than originally expected. The functions and decisions taken around them deserve further assessment in the light of what is "primary" to the way Koha operates, and what seemed to be "best fit" at original design.

2.5 Typical Usage Scenarios

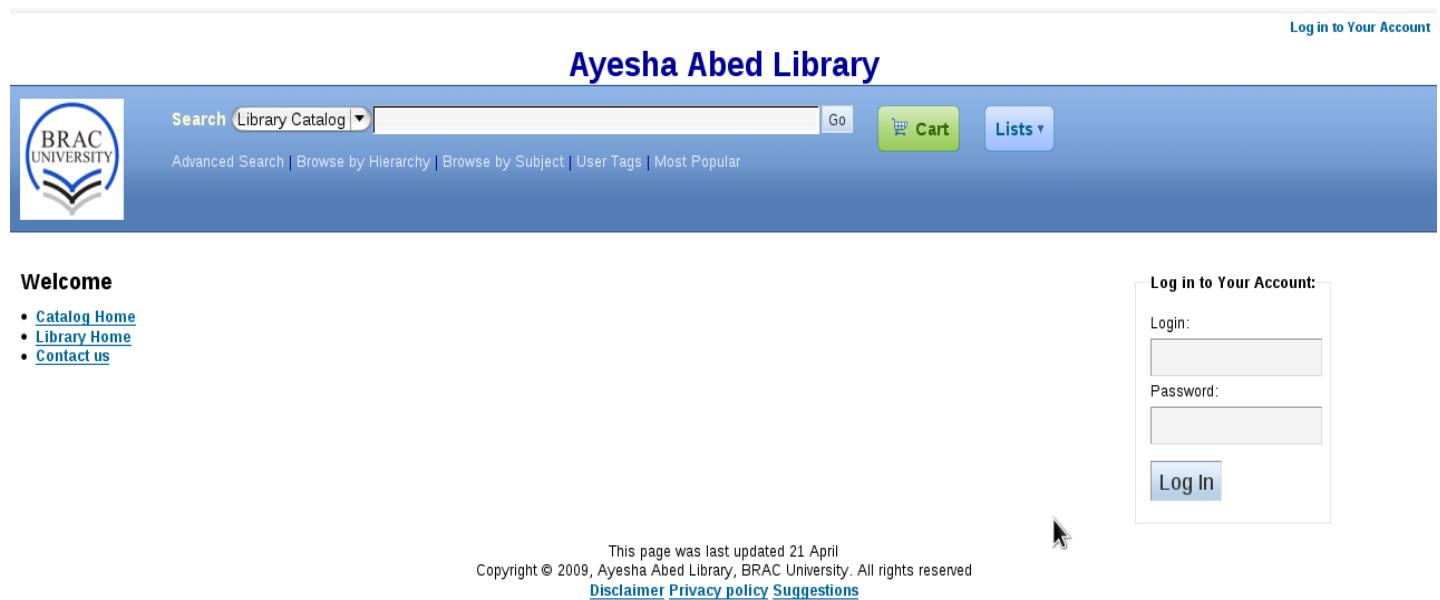
2.5.1 Patrons

Fig: 2.5.1.1 Patron Use Case (UML)



The most visible component of Koha is the OPAC (Online Public Access Catalog) front-end. It is accessed by the library's patrons via a web browser client (which application or version is unknown) and typically results in the patron locating a particular item, noting the location either by printout or other means, and walking away to locate one or more of the items returned by the catalog search they have just executed.

Fig:2.5.1.2: OPAC view of Ayesha Abed Library KOHA system



2.5.2: Staff

Koha's design groups all key staff functions that are not intended for patron access into one unified interface, referred to as the "Intranet" component. This is hidden from the patron (in practice) by placing the front-end for the Intranet on a different network port. With this solution, the Koha design avoids a limitation on the number of possible staff terminals and accidental patron 'discovery' of the staff only functions (and permits greater security to be added to the Intranet component if desired). By using the same client-server design for both front-ends, it also permits great flexibility for staff in the event of equipment failure or if physically dispersed operations.

A typical library staff includes a "front desk," traditionally reference librarians and circulation specialists, and "back office," which deals with all matters relating to the arrival and departure of books from the collection.

Fig: 2.5.2.1: Staff login page of Ayesha Abed Libray KOHA system:

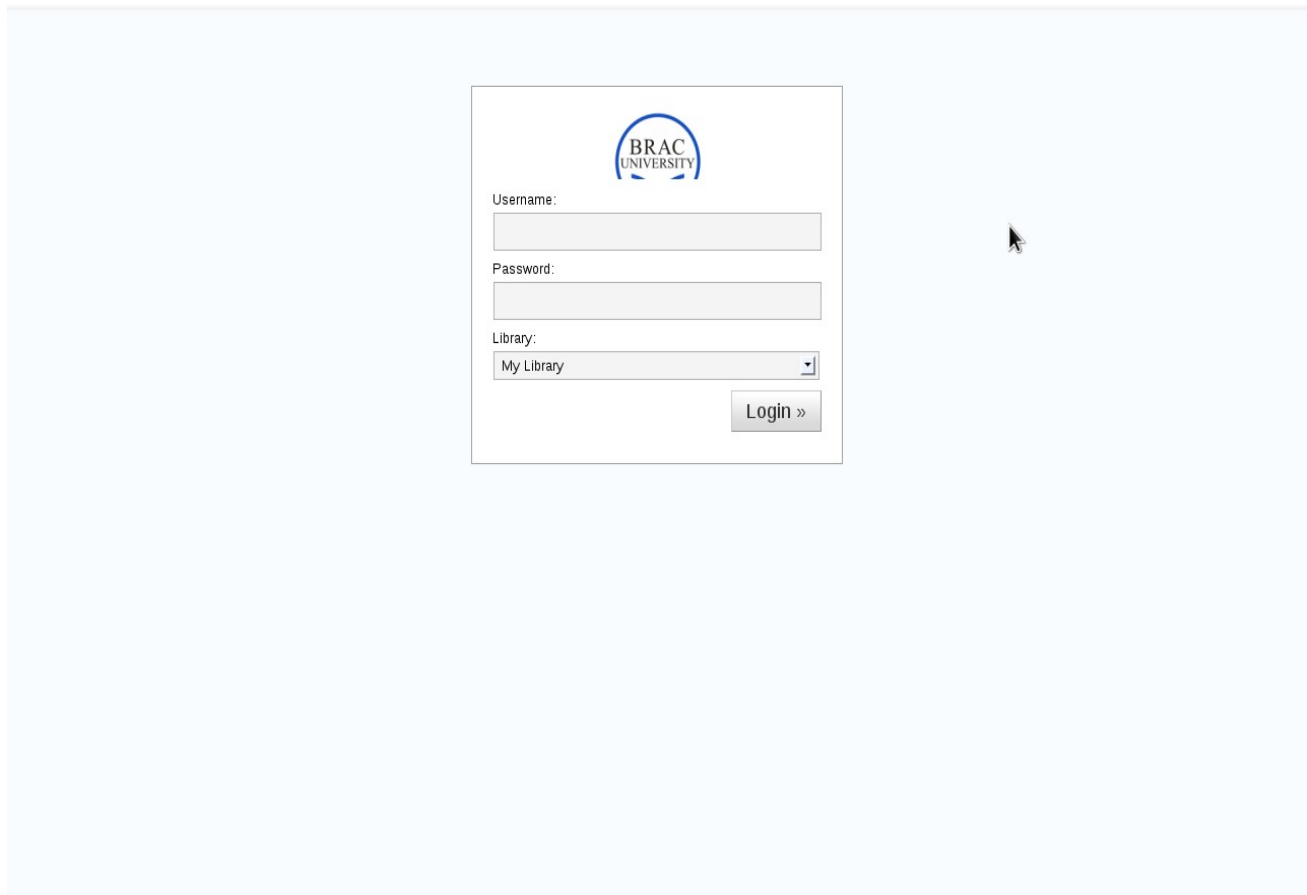


Fig:2.5.2.2: Staff logged in! Administrative dashboard.

Circulation Patrons Search More ▾

NO_LIBRARY_SET (Set) | koha (Log Out) | [?]

News

Welcome to Ayesha Abed Library

Welcome to Koha. Koha is a full-featured open-source ILS. Developed initially in New Zealand by Katipo Communications Ltd and first deployed in January of 2000 for Horowhenua Library Trust, Koha is currently maintained by a team of software providers and library technology staff from around the globe.

Posted on 29/10/2007 [Edit](#) [Delete](#) [New](#)

What's Next?

Now that you've installed Koha, what's next? Here are some suggestions:

- [Read Koha Documentation](#)
- [Read/Write to the Koha Wiki](#)
- [Read and Contribute to Discussions](#)
- [Report Koha Bugs](#)
- [Submit Patches to Koha using Git \(Version Control System\)](#)
- [Chat with Koha users and developers](#)

Posted on 29/10/2007 [Edit](#) [Delete](#) [New](#)

Circulation

- Check out to:
- [Check in](#)
- [Transfers](#)

Patrons

- Search:

Search

- Search catalogue:

Lists

Cataloging

- [Add MARC Record](#)
- [Authorities](#)
- [Serials](#)

Acquisitions

Reports

Koha administration

- [System preferences](#)

Tools

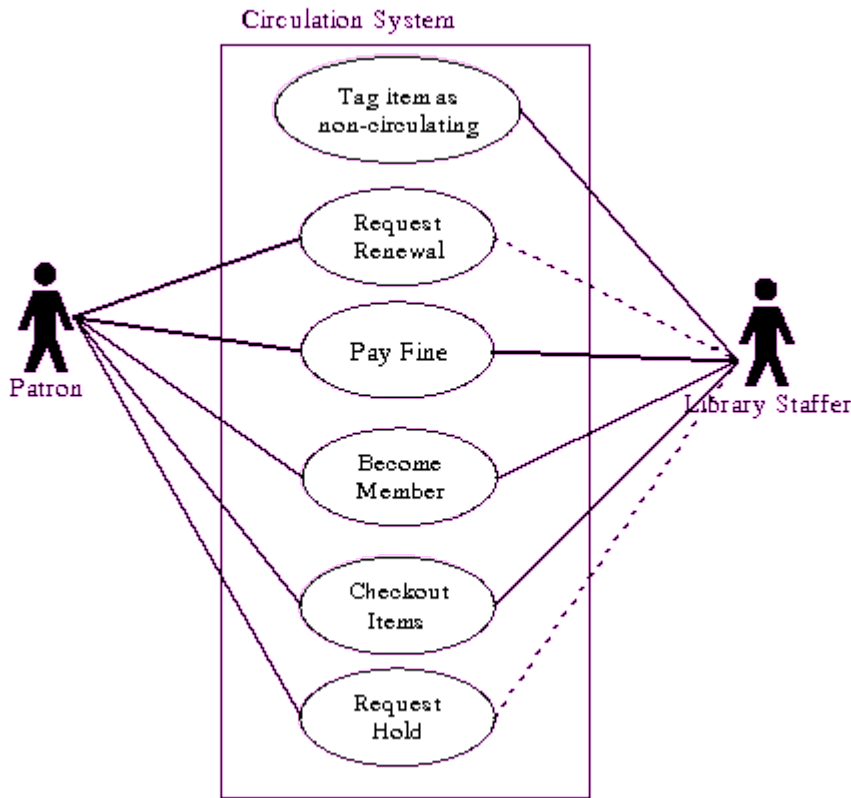
About Koha

2.5.3 Circulation & Reference Staff

The front-desk personnel of the library use Koha to process book returns and checkouts, as well as assist patrons in catalog searches (see Patron Use Case). The normal process for has the patron presenting some form of library card and the items they wish to checkout. The staff member then enters first the patron ID information followed by the tracking number for the items, and the patron being given either a receipt or verbal information regarding due date.

The circulation staff is normally also responsible for the issuance of new library cards to new library members.

Figure 2.5.3.1 Circulation Use Case (UML)

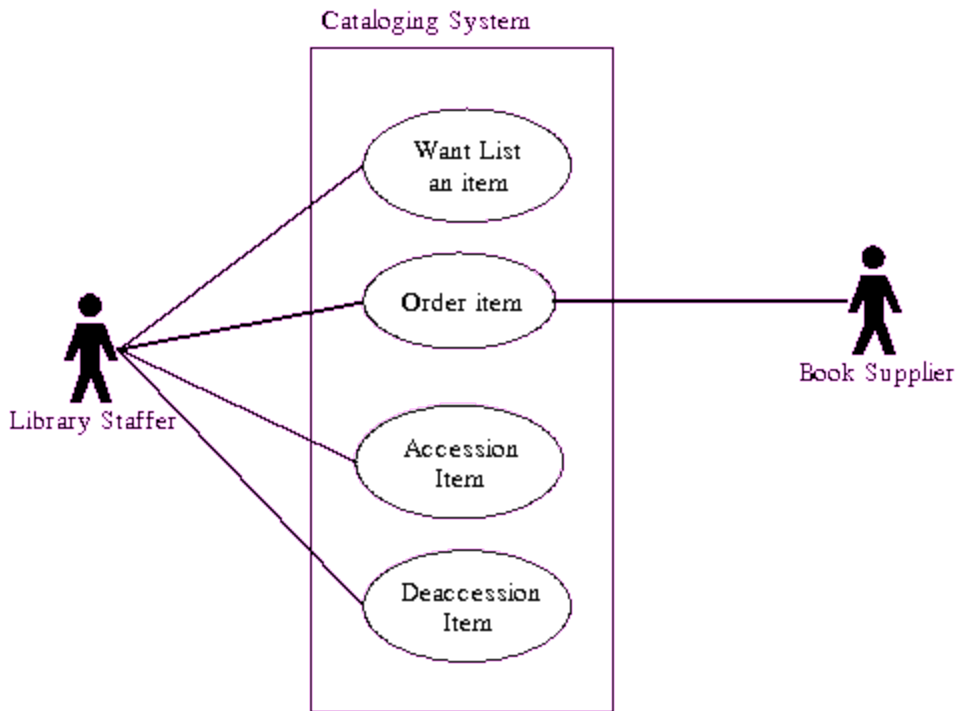


2.5.4 Cataloging Staff

The back-office library staff usually typically perform several roles: item accession (the adding of items to the catalog), de-accession (also known as "weeding the collection"), maintenance (for example, noting a book is out for rebinding), and item purchase and post-purchase tracking.

When funds become available, it is normal practice for the library to order additional materials.

Figure 2.5.4.1 Cataloging Use Case (UML)



2.6 What`s new in KOHA 3.0?

1. *Zebra plugin* - Zebra is a high-performance, general-purpose structured text indexing and retrieval engine. It supports large data sets (tens of millions of records) and includes support for SRU, Z39.50 and several query languages: CCL, CQL, and PQF.

Zebra is a high-performance, general-purpose structured text indexing and retrieval engine. It reads structured records in a variety of input formats (eg. email, XML, MARC) and allows access to them through exact boolean search expressions and relevance-ranked free-text queries.

Zebra supports large databases (more than ten gigabytes of data, tens of millions of records). It supports incremental, safe database updates on live systems. Anyone can access data stored in Zebra using a variety of Index Data tools as well as commercial and freeware Z39.50 clients and toolkits.

Zebra is free software, available under the GPL license. It may be used by anyone without charge. If you wish to incorporate Zebra into a commercial software distribution, please contact us about alternative licenses.

Koha's new search engine, built on top of Zebra, supports features such as relevance ranking, field weighting, truncation, stemming, use of fuzzy operators, language-specific indexing, sorting, etc.

2. *New installer* - based on the common Perl module ExtUtils::MakeMaker, the new installer makes it a snap to get Koha running on just about any platform.

The installer comes complete with a Developer's Toolkit target ('dev') that can be used to get a development environment linked directly to revision control, to support rapid prototyping and an agile development process.

3. *Standard APIs* - Koha 3 supports a number of important library search and retrieval standards and microformats, such as SRU/W, Z39.50 (<http://www.loc.gov/standards/sru/>), UnAPI (<http://unapi.info/>) and COinS/OpenURL (<http://ocoins.info>).

Also supported is the popular Internet standard: OpenSearch (<http://opensearch.a9.com/>) created by Amazon's A9.

Indexes are updated in real-time with circulation transactions, enabling limits by availability and statuses.

Faceted refine-by limits are available from both staff and opac interfaces.

For libraries that don't want the overhead of maintaining Zebra, Koha 3 ships with a NoZebra option, in which bibliographic and authority data is indexed in the RDBMS.

Records are stored internally in an SGML-like format and can be retrieved in MARCXML, Dublin Core, MODS, RSS, Atom, RDF-DC, SRW-DC, OAI-DC, and EndNote; and the OPAC can be used by citation tools such as Zotero. Creating new export formats is a trivial exercise in writing XSLT; records can be passed through XSLT transformations either directly out of the index, or via a separate parsing function.

To retrieve and interact with Circulation and Patron data, Koha 3 includes support for 3M's Standard Interchange Protocol (SIP2), using the OpenNCIP libraries (<http://openncip.org>).

There are also an ever-expanding set of native REST APIs to handle interoperability with external tools such as third-party cataloging clients. These APIs provide authentication as well as add/edit/delete control over bibliographic data within a Koha system. For more information, see:

http://wiki.koha.org/doku.php?id=en:development:web_services

Koha 3 also includes pluggable authentication - easy integration with LDAP and Active Directory via the Auth_with_ldap module.

Enriched content web services, such as those offered by Amazon.com, Baker and Taylor's Content Cafe, and the Google Book API can be enabled to enrich bibliographic content with jacket covers, professional reviews, ratings and comments from users, as well as point to 'Similar Items' within the catalog. OCLC's xISBN, and LibraryThing's ThingISBN can likewise be enabled to provide an 'Editions' tab, pulling together all the formats, languages, and editions of a work into the item detail pages. New with Koha 3 is service throttling for these services, to keep within subscription limits.

4. *Cross-platform, multi-RDBMS, Web-server agnostic* - Run Koha on the platform of your choice: Linux, Mac OS X, FreeBSD, Solaris. Koha 3 also includes better support for multi-RDBMS (MySQL 5.0 and PostgreSQL), and runs under Apache2, IIS, or the web server of your choosing.

5. *Multi-lingual support* - Koha was designed from the ground up for multilingual libraries. Koha 3 can handle Chinese, Japanese, and even right-to-left languages such as Arabic and Hebrew with ease (BiDi).

Koha's index engine (Zebra) can handle record formats containing any UNICODE compliant script, such as Arabic, Chinese, Hebrew, Japanese and Korean. Zebra has this support via the ICU libraries created and maintained by IBM.

6. *New templates* - Koha's staff and patron interfaces are developed with a template system that's easy to theme. The default templates are composed of 100% valid XHTML and CSS.

7. Koha 3 has quite a few new modules, as well as enhancements to existing modules, including: news writer, label creator, calendar, OPAC comments, MARC staging and overlay, notices, transaction logs, guided reports with a data dictionary and task scheduler, classification sources/filing rules, and more!

CHAPTER 3

Implementation of KOHA in BRAC University

BRAC University's current library system BULMS (BRAC University Library Management System) implemented in 2001 which was developed by a local vendor. But the current system is wefully out of data with today's modern library standards and it it not suffieciently robust ot meet the needs of our library patrons or staff. Consequently in late 2007,. the decision was made bh the library commitee in exploring the possiblity of doing away with our commercial librawry software and replacing it with affordable alternative software. Considering the robust need we were looking at open source solution.

We have been working with the library personnel the following list of requirements of the library:

- * Open and Standard source
- * System upgrades-new or enhanced modules
- * Web interface
- * MARC support
- * Z39.50

- * Report generation
- * Acquisition management-tracking vendor files, budget, order, receiving, claiming etc
- * Circulation control-check in/out, reserve, hold processing etc.
- * Serial control-check-in,routing,claiming,binding etc.
- * ILL management
- * Barcode input and generator
- * Entire software is customizable
- Active development status and world wide user community etc.

We investigated some open source software like PMB,PhpMyLibrary,OpenBiblio,Emilda,Koha & Evergreen. During our investigation it was found that most of the open source library management softwares are either in developing stage or not have full functional modules. Of these KOHA satisfies key functional requirements of a library management system and supports essential modules such as cataloguing, circulation and OPAC that BRACU library requires.

The main purpose of the project is to implement a complete library automation system using open source software KOHA and develop ourselves as local resource, and in turn help to build capacity in other libraries who may want to move to automation using KOHA. Other intentions of the project are to convert data from the existing library systems into standard format (MARC 21) that will preserve and insure its continued development and preservation, as well as the ability to migrate data to new generations of library systems which will enable us rapid communication with other libraries (including outreach libraries).

3.1 Challenges of implementing KOHA in our Ayesha Abed Library

3.1.1 Existing data are not in standard format:

Our existing data of BULMS are not in standard format. That means, though, a huge amount of time and cost has been wasted to input these data here in our current database, but, everything are meaningless. More than 95% data are not in standard format. That's why, when we are implementing this new system KOHA here in our library, we faced and facing a lot of trouble for this conversion. Now, we are inserting each and every book's information in a very new way and now we are following our standard.

3.1.2 BULMS (BRAC University Library Management System) is not upgraded:

BULMS was installed in 2001. And, even now, in 2009, it has not been upgraded. That means, we are using eight (8) years old software in our library. And, as much as it is getting older, it is creating problem day by day. For example: "Check in" / "Check out" worked for first two (2) years, but now, it is worthless.

3.1.3 Lack of portability:

If anyone wants to use BULMS in his/her machine, he/she needs to install it there. And, in order to do that, he/she needs to install Microsoft Visual Basic there in that machine. Which is really peculiar. Now, what about other platforms like Linux, Unix or Mac? No, it is not possible to run BULMS in Linux or Unix or Mac operating system. Yes, we can do that with Wine emulator, but, normally, this is not possible.

including multimedia content in koha via external link. How is it done?

3.1.4 BULMS (BRAC University Library Managment System) is not customizable:

BULMS is not customizalbe. Though, it was developed by "Documenta", so this is not possible for anyone to customize it without "Documenta"'s help. Curse of Closed Source Software!!!

3.1.5 The development domain of BULMS is very small:

Though, one software company developed this software, so, it`s domain of usability and development is very small. Within this Ayesha Abed Library.

3.1.6 Bangla is not available in BULMS (BRAC University Library Management System):

Local language support is not available in BULMS. That`s why, if any bangla book comes, it creates a huge difficulty to entry and searching.

3.1.7 BULMS (BRAC University Library Management System) is only for authorized persons:

BULMS is only a one way software. It means, with BULMS, the *authorized person* can only entry or edit information in library database. On the other hand, the system administration of BULMS belongs to another group of different authorized persons. Here, these second level persons are different from librarians or even head librarians. So, a complete boundary is visible there.

3.1.8 Report Generation is not available in BULMS (BRAC University Library Management System):

There is no option there in BULMS to generate reports there. Here, reports means, acquisition report, check in / check out report and others.

3.1.9 ILL (Inter Library Loan) system is not available:

In BULMS (BRAC University Library Management System) ILL or Inter Library Loan system is not available. Though, this term is not so much popular or sometimes may be unknown in our country but, this ILL is very famous in foreign countries. It means, one library shares or borrows books or other knowledge contains materials from another library. And also vice versa!

Though, this term is trying to start itself in our country but, unfortunately in BULMS there is no term for this Inter Library Loan term.

3.1.10 Acquisition Management is void in BULMS.

There is no acquisition management in BULMS. That`s why vendor files tracking is completely unknown there. As well as budgeting, ordering, receiveing and claimings are also zipped in this system.

3.2 How these challenges are overcoming?

3.2.1 MARC records : A standard format.

We are inserting data into a new format, which is the standard format. MARC21. According to wikipedia: " **MARC** is an acronym, used in the field of [library science](#), that stands for **MAchine-ReadableCataloging**. The **MARC standards** consist of the MARC formats, which are standards for the [representation](#) and [communication](#) of bibliographic and related information in machine-readable form, and related documentation. It defines a [bibliographic data](#) format that was developed by [Henriette Avram](#) at the [Library of Congress](#) beginning in the 1960s. It provides the [protocol](#) by which [computers](#) exchange, use, and interpret bibliographic information. Its [data elements](#) make up the foundation of most [library catalogs](#) used today.

The record structure of MARC is an implementation of [ISO 2709](#), also known as ANSI/NISO Z39.2.^[1] MARC records are composed of three elements: the record structure, the content designation, and the data content of the record. The record structure implements national and international standards (e.g., Z39.2, ISO2709). The content designation is "the codes and conventions established to identify explicitly and characterize ... data elements within a [record](#)"^[1][AACR2](#), [L.C. Subject Headings](#), and [MeSH](#).^[2] and support their manipulation. The content of data elements in MARC records is defined by standards outside the formats such as

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The future of the MARC formats is a matter of some debate in the worldwide library science community. On the one hand, the storage formats are quite complex and are based on outdated technology. On the other, there is no alternative bibliographic format with an equivalent degree of [granularity](#). The [huge](#) user base, billions of records in tens of thousands of individual libraries (including over 50,000,000 belonging to the [OCLC consortium](#) alone), also creates [inertia](#). (See also the concept of [Path dependence](#).)"

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tens of thousands of individual libraries (including over 50,000,000 belonging to the [OCLC consortium](#) alone), also creates [inertia](#). (See also the concept of [Path dependence](#).)"

Though, the format of existing data of BULMS is not in any kind of standard one, we couldnot convert it into standard one. So, we had to re-format and re-enter each & every data into MARC 21.

Till today 08 August 2009, 2000 datas has been converted into MARC 21 format. And, for using KOHA, we can also import MARC records from Library of Congress, New York University Libraries, Columbia University, New York Public Library, Smithsonian Institution Libraries etc.

3.2.2 BULMS (BRAC University Library Management System) is not upgraded, where as KOHA is a dynamic one.

BULMS was installed 2001 in BRAC University and it hasn't been upgraded for last eight (8) years. But, if we use KOHA; we can upgrade it as soon as the new KOHA version releases. And, this is the main advantages of using KOHA. As for example: personally, i have been upgrading my own KOHA from "koha-3.0.1" to "koha-3.0.2" just after three (3) months. And, some days ago, i have upgraded my "koha-3.0.2" to "koha-3.0.3". And, the duration of v-2.0 & v-3.0 is only 2 months. So, from here, we can see that, it is possible for us to be upgraded at any time we want.

You can check the KOHA development tree here: <http://git.koha.org/>

3.2.3 KOHA is web based.

We don't need to install KOHA on each and every machine to use it. KOHA is installed in a server and from there, it serves through Internet Protocol Address or it's own website. So, each and every job will be done over only web browser. Now, we don't need to bother for third party softwares like Microsoft Visual Basic or something like that for using a "complete library managment system".

So, we have increased our flexibility and definitely portability.

3.2.4 KOHA is GNU licesensed open source software.

Customization is in our hand. We have already customized our KOHA system just according to our needs. From user interface to policy making, from system preferences to budget making, from item types administration to vendor organization.. we have customized our own KOHA.

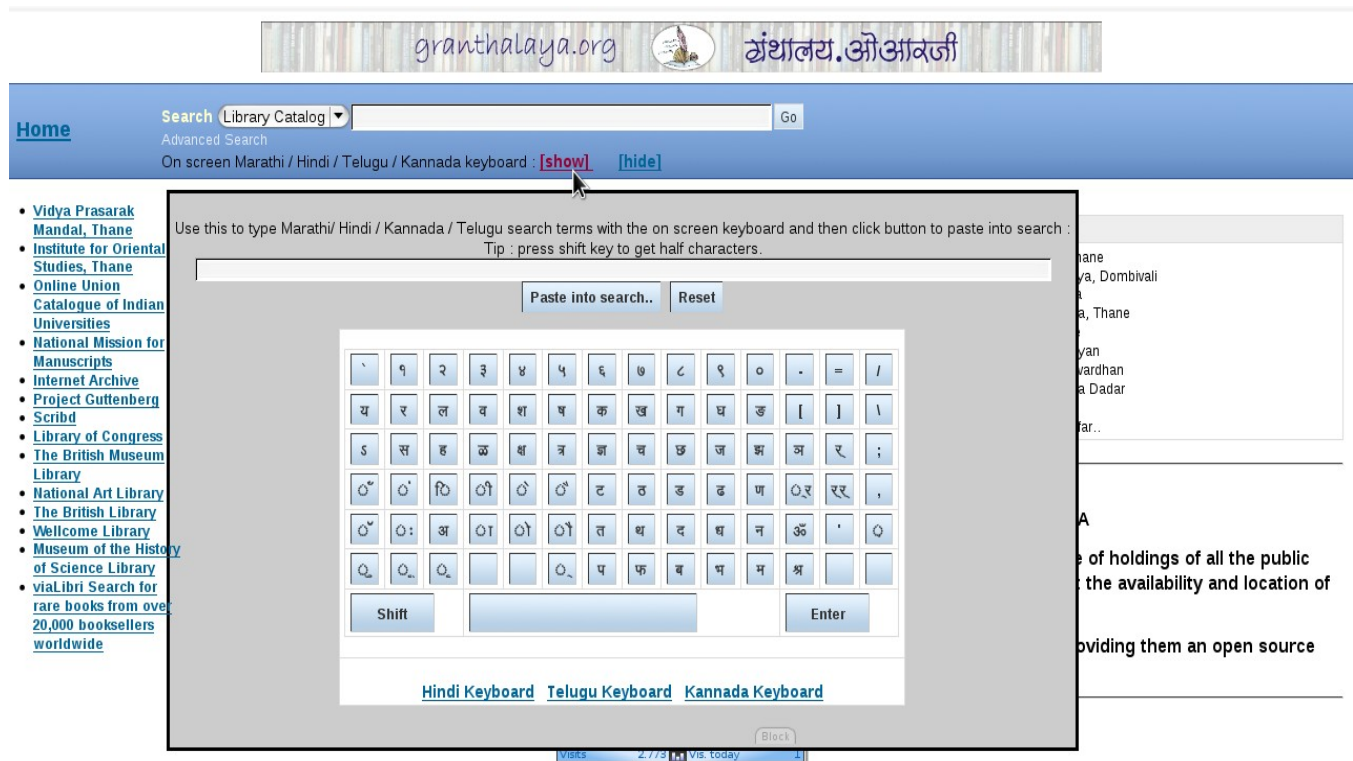
3.2.5 Active development status and world wide user community.

Because of open source capability, the users of KOHA can help from lots of thousands of other users, developers & even maintainers. Various mailing lists, IRC channels are ready to help koha users.

3.2.6 KOHA is Unicode compatible.

KOHA is fully Unicode supported. We can import bengali records in KOHA. We can even localize our whole KOHA system. Here, we can see one KOHA site with localized keyboard.

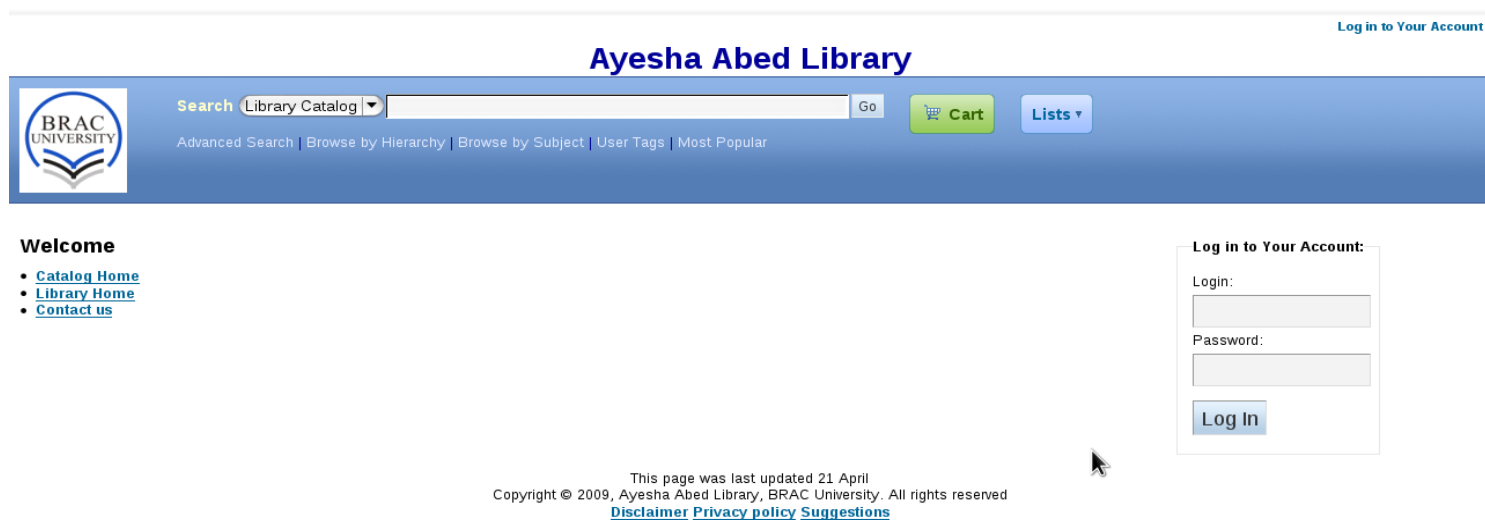
Fig: 3.2.6.1: KOHA OPAC with on board localized keyboard



3.2.7 The security system of KOHA is really great and as well as comfortable.

The security system of KOHA is really tight and as well as really comfortable for each and every level of user. This level starts from System Administrator of the KOHA system to part time employee of library. Here, in KOHA, anyone can search any book from anywhere of the world in any time; with the help of OPAC. Here, he/she doesn't need to be a registered member of the library. Here, OPAC stands for Online Public Access Catalog. Here is the OPAC view of our Ayesha Abed Library.

3.2.7.1 OPAC view of Ayesha Abed Library KOHA system:

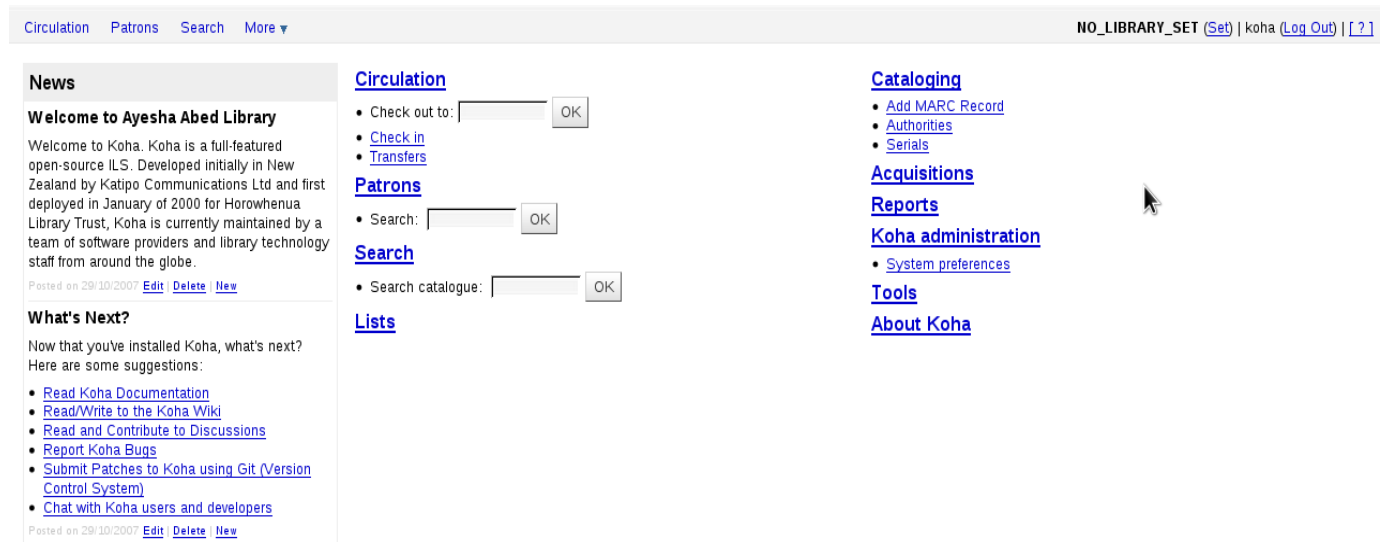


The screenshot displays the OPAC interface for Ayesha Abed Library. At the top right, there is a link for "Log in to Your Account". The main header features the library's name "Ayesha Abed Library" and the BRAC University logo. A search bar is present with a dropdown menu set to "Library Catalog" and a "Go" button. To the right of the search bar are buttons for "Cart" and "Lists". Below the search bar, navigation links include "Advanced Search", "Browse by Hierarchy", "Browse by Subject", "User Tags", and "Most Popular". On the left side, a "Welcome" section contains links for "Catalog Home", "Library Home", and "Contact us". On the right side, there is a "Log in to Your Account" form with fields for "Login:" and "Password:", and a "Log In" button. At the bottom center, a copyright notice states: "This page was last updated 21 April Copyright © 2009, Ayesha Abed Library, BRAC University. All rights reserved." Below this notice are links for "Disclaimer", "Privacy policy", and "Suggestions".

On the other hand, authorized personnel like library staff can enter into very different portion of the KOHA system with very different view. There they need to log in with valid username and password. And, it can be added that, this authorization can be divided into various part too. As for example, library staff who only does the circulation, will be *only* authorized for circulation part of the KOHA system. He/She will not able to go into other system as

well. And, this is true for each and every authorized person in the whole library. KOHA call this different view "Administrative View". Here is the Administrative view of Ayesha Abed Library KOHA system.

Fig: 3.2.7.2: Administrative dashboard of Ayesha Abed Library KOHA system



3.2.8 Report generation is dynamic here in KOHA

We can create reports on various portion in KOHA. As for example, we can create reports on Acquisition, Patrons, Catalogues, Circulations and etc. Plus, reports on most available and most circulated items are also available there. The reports can be saved in various format, like excel sheet or online.

Fig: 3.2.8.1: Report generator page of KOHA

Circulation Patrons Search More ▾ Ayesha Abed Library (Set) | Zico (Log Out) | [?]

BRAC UNIVERSITY

Enter patron card number or partial name:

[Check Out](#) [Check In](#) [Search the Catalog](#)

[Home](#) > Reports

Reports

Guided Report Wizard

- [Guided Reports](#)

Statistics wizards

- [Acquisitions](#)
- [Patrons](#)
- [Catalogue](#)
- [Circulation](#)

Inactive

- [Patrons who haven't checked out](#)
- [Items with no checkouts](#)

Top Lists

- [Patrons checking out the most](#)
- [Most-Circulated Items](#)

Other

- [Items lost](#)
- [Catalogue by itemtype](#)
- [Average loan time](#)

3.2.9 ILL (Inter Library Loan) system is available in KOHA.

Though, this Inter Library Loan system is not so much popular here in Bangladesh, but, KOHA fully supports this system. And, it has a very concrete engine for ILL management.

3.2.10 KOHA Acquisitions Module.

KOHA has two acquisition module. First, Simple acquisition and Normal (Complete) acquisition. Simple acquisition acquire materials and add directly to the catalogue using the catalogin module; does not manage budgetary matters or order with vendors. Where as, Normal (Complete) acquisition manages the entire process, from budget to vendors; uses "Shopping Baskets"

3.3 Future work:

We have completed our primary job which includes KOHA server setup in Ayesha Abed Library, BRAC University, Customize KOHA according to our needs, Convert data of various books in MARC21 format and inserting those records in our KOHA server. We have inserted 2100 Marc records so far (till August 9, 2009). And, 99% Marc records are perfectly all right.

Now, we have some other jobs to do:

3.3.1 Integrating KOHA with our Digital Library

We are already running Dspace, an instituional repository in our university. Now, we are trying to integrate our KOHA Integrated Library Management System with Dspace, our instituional repository system. I have been trying to use a metasearch middleware named "Pazpar2", which is a built in tool in KOHA. I need to configure it in such a way that, it can scan and read data from dspace and koha simultaneoulsy. Pazpar2 is actually a high-performance, user interface-independent, data model-independent metasearching middleware webservice which featuring merging, relevance ranking, record sorting, and faceted results. In a nutshell, pazpar2 is a web-oriented Z39.50 client. It will search a lot of targets in parallel and provide on-the-fly integration of the results. The interface is entirely webservice-based, and user can use it from any development environment. It has been particularly designed to be a good fit for use in conjunction with Ajax to build dynamic end-user experiences, and this can be combined with server-side logic to support authentication, resource selection, etc. Configuration can be static, using XML configuration files, or fully dynamic, using the webservice API. It is data model-independent in the sense that incoming records are normalized using XSLT to an internal tagged-field representation, and the software can in turn be configured to use different elements of that format for ranking, merging, sorting, facets, and display.

3.3.2 Multimedia contents

We are going to add e-resources in our KOHA system. As for example: E-Books, E-Journals, Videos from various sources like Youtube, MetaCafe, Google Videos and other. We will provide only url links there in our search items and users of our library will be able to access that specific videos from that site. This will be also true for audios. And, this is not any complicated job by the way. Because, in MARC format there is a field for URLs only. And, if we put url address there, it works fine.

3.3.3 Rating

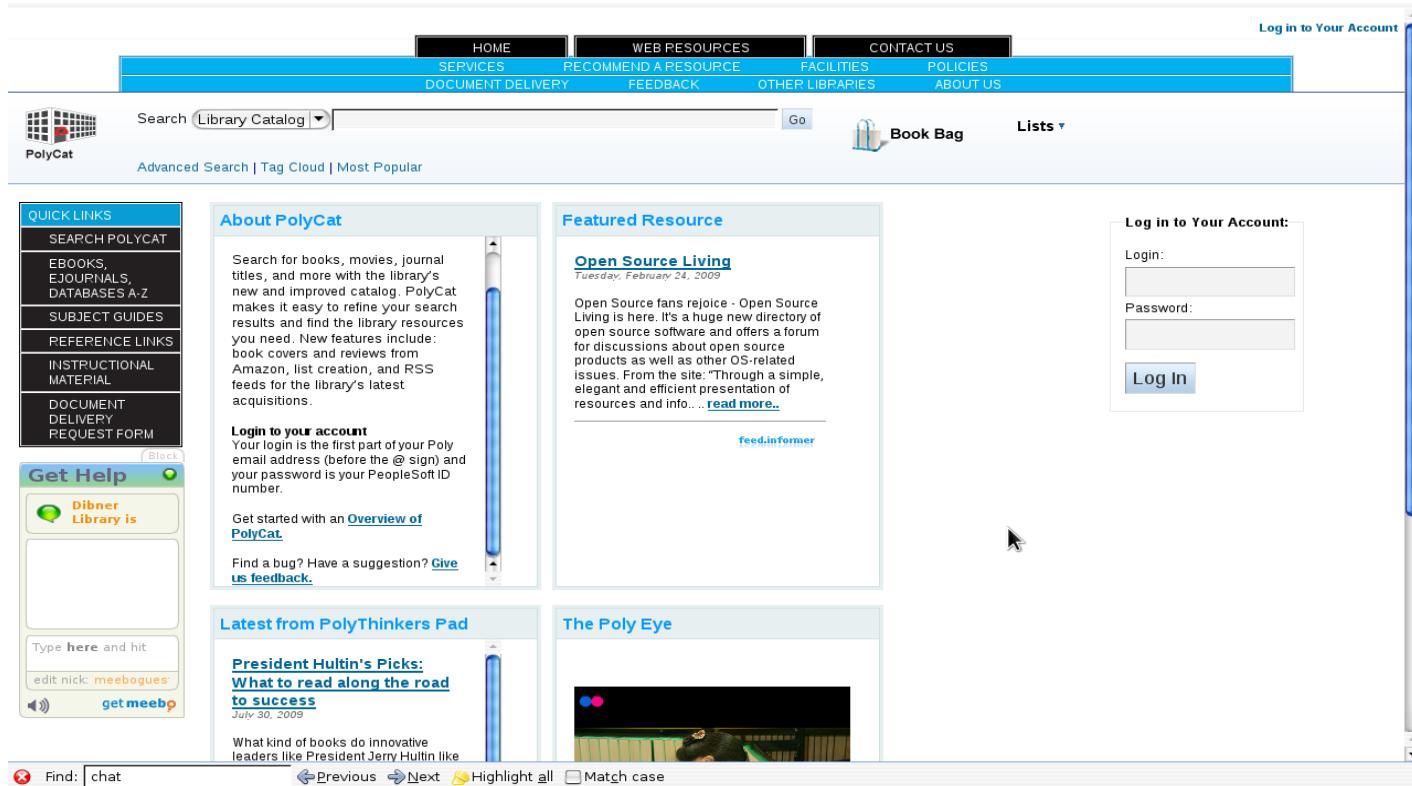
Rating will be added for each and every materials. Yes, it is true that, anyone can check out the comments for every materials, but, i think, it will be more clear and speedy process, if we can add a Rating View in our site.

3.3.4 Live help

We are going to add chatting option there in our OPAC view. With which the patron can chat with the available librarian. And, it is a 24x7 service, which will definitely help the patron a little bit than a usual one.

Here is one example of Bern Dibner Library Catalog:

Fig: 3.3.3.1: screenshot of Bern Dibner Library Catalog



REFERENCES

1. <http://liblime.com/>
2. <http://libraries.idaho.gov/blogs/>
3. <http://wiki.koha.org/>
4. <http://www.bcr.org/>
5. http://www.kohadocs.org/Koha_architecture.html
6. <http://www.granthalaya.org/>
7. <http://koha.org/>
8. <http://www.indexdata.com/zebra>
9. <http://en.wikipedia.org/wiki/LibLime>
10. <http://search.athenscounty.lib.oh.us/>
11. <http://public.demo.kohalibrary.com/>

And various other blogs.

END