



Library Book Caching: A Novel Add-on tool for Physical Libraries

¹A. Rawal, ²A Sinha, ³S Parween ³P Bhattacharjya ³A Dutta

¹Professor, ²Assistant Professor, ³Student

¹²Information Technology ³Computer Science & Engineering

¹²³Asansol Engineering College, Asansol, India

Abstract: Library Book Caching System is a fair attempt for booking the library books for issue-return transactions well before the library user visits the library in person to a physical library. This novel idea is an attempt to resolve long book-issue-return transaction queues due to which library users often face long library-queue wait hours, each time they visit the library for availing library facilities. As a result, remotely commuting students, staff and faculty along with day scholars never try visiting libraries for issuing books. Hence, the caching portal is intended to resolve such transaction issues by facilitating such students / faculty to undergo booking requests for the books well beforehand. Such requests shall be seen as daily book cache summaries for taking the books from shelves before the library users visit transaction windows. The tentative date / time of seeking books can be signaled to the requesting users after the books have been cached near the windows. Such a caching portal of any physical library helps library staff to resolve long wait queues of library visitors and hence, undesirable chaos near the transactional windows. It also reduces the workload of library staff and increases the time-utilization of work hours.

I. INTRODUCTION

Amidst the popularity of digital library resources being promoted by national level organizations, the library users in our country are getting more inclined to online available materials and lots of freely downloadable books. However, all readers do realize that there is no replacement for physical libraries for all students and faculty who need hard-print versions of books for in-depth study and group work for notes-formulation and project-completion tasks. In current times of acute internet usage, the library visitors and users are habituated to visit physical libraries only for accessing course curriculum books that too during restricted slots beyond class and laboratory -interaction hours. Remotely commuting students do not seem interested in availing library resources during restricted library hours and that they need to commute back to their homes by travelling long distances after strenuous work-hours. Under such situations, handling issue-return procedures for such library users requires brainstorming sessions using innovative techniques. Hence, the task of library staff is expected to be eased out through library book caching tool which will be very useful to library visitors (students and teachers) of colleges.

II. BACKGROUND

2.1 Current Scenario

In the present times, issue and return procedures are being handled in conventional manner in any physical library. Moreover, with the advent of the internet and promotion campaigns of digital libraries, accessing the shelved books in physical libraries and their maintenance has become a challenging task as all (regular) library users find standing in long issue-return queues, very tiring and a waste-of-time task. Even library issue-return support systems configured on desktops at issue-return windows handle library users in sequential mode and are not capable of managing our library's huge issue-return queues during library office hours.

2.2 Motivation

The presented work is a fair attempt to draw attention to library sections of any academic institution, whether schools, training centers or higher educational institutions towards time-efficient utilization of library resources in physical libraries within working hours of the organization. Library users (mostly students, faculty and staff) who are coming from remote and sub-urban areas are unable to access books or use other library facilities using routine issue-return procedures due to limited library accessing hours.

1. Need for Updated Library Book catalog - availability status of books available on OPAC (OPen Access Console);
2. Manual method of fetching books can be partially expedited by resolving long wait queues for issue-return transactions that arrives to issue-return windows in batches at one stretch in a day;
3. Tracing library books (on demand) to already issued users needs to be resolved.

III. PROBLEM FORMULATION & ANALYSIS

3.1 Problem Overview

The problem formulation follows a student-centric approach. If a student is allowed to send booking request to the library section for issuing a book well beforehand, the day he or she is coming to the institution premise and the library staff keeps the book reserved for that issue-request on First-Come-First-Serve basis, the issue-return transactions can be operated with in no time.

It may be noted that the pre-booking of a library book is termed as *Book Caching Concept* by our work group throughout this paper. This concept is designed for students who fall in one of the following categories:

Remote commuters: Students commuting from far off places face problems in the issue return process. Remotely commuting students are unable to issue their books due to huge library traffic during library hours

Day scholars: Day scholars are those who reside in nearby residential colonies of the same town or city or localities spanning within 10 - 15 kilometers from the place of their study.

Hostelers: Booking the book process by integration with Libraries book database. A Real time Transaction log of database is provided for booking a book from library book catalogue.

Reflecting the booking status on administrator console where he/she can approve or decline the booking request of book cache. And the updated book catalogue will be displayed.

3.2 Survey Findings

A small-scale survey was accompanied with this project where the survey was taken from a small population size of 100-200 participants. The survey had the following questionnaires: {student's credential, to-and-from commuting time to work place & back home, average time spent in library for issue / return procedures}. The outcome survey can be interpreted with the help of graph visualizations as shown in figures 1 and 2.

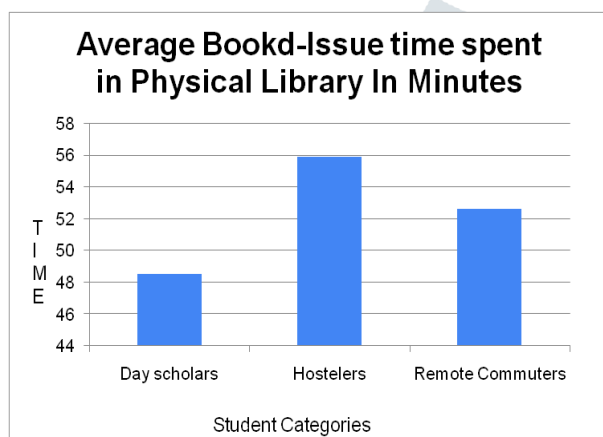


Fig. 1 Average Issue time spent in Physical Library

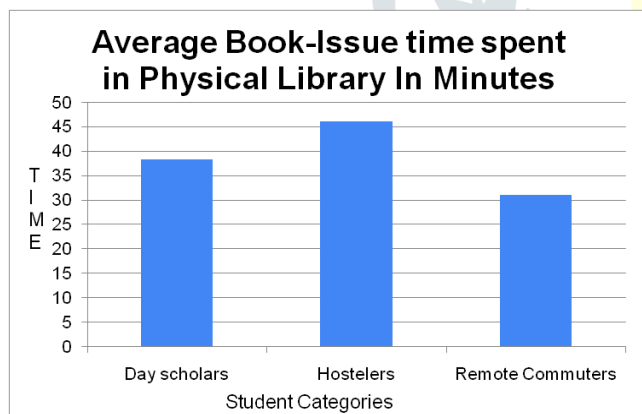


Fig. 2 Average Issue-Return time spent in Physical Library

It can be observed from the above visualizations that the library staff takes due care of remote commuters (in priority) followed by day scholars and then followed by hostellers while performing issue-return transactions but with inevitable time delays.

3.3 Book Caching Tool Design Features

As any other user-interface, the majority of the rights are provided to the administrator. Tool design constraint can be defined as: "What will be the maximal number of library users who can enjoy successful issue-return transactions within a defined set of resource constraints: human resources & allotted computers"?

3.3.1 Front End Visualization

The administrator is given the right to add books, browse & download the book caching requests, issue the book and can see the request for unavailable books. The requests can be handled by taking out the available books from shelves and keeping them reserved for the library visitors. This can be generated in the form of daily book caching-request log files to be used by

supporting staff to pile up the requested books in cached shelves of the library. Thus, the task of library staff seated across issue-return windows gets eased out by handling the library window queue within tolerable time spans.

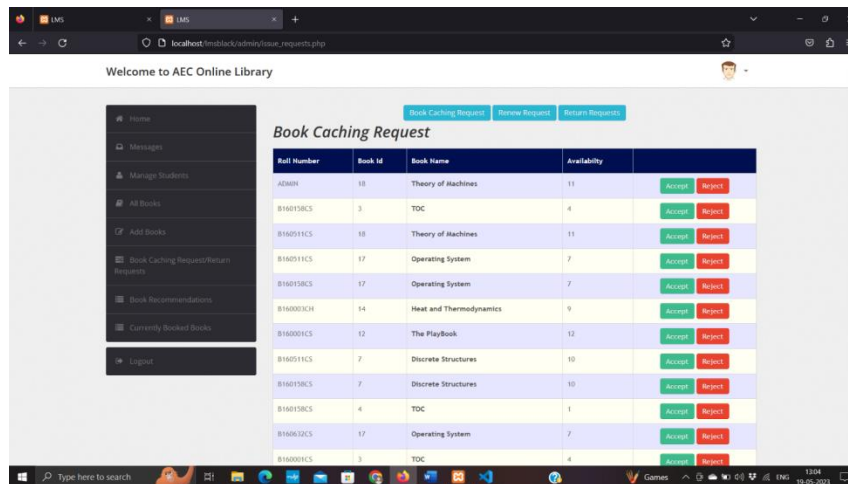


Fig 1. Students' caching request queue for book-issue (Book Caching Portal).

The un-available books identified under daily book-caching request log files are handled at the back-end separately and are detailed out in the sub-section below.

3.3.2 Back End Computing

The master database existing as a library-book catalog is handled using several database operations like accessing, filtering and adding library book instances. Here, the back-end computing intends to provide the browsing the book-availability status of master catalog at the end of library user's gadget, updating the book availability status of master catalog after more booking requests arrive in caching request queue and providing texting alerts to the library users about the non-availability of requested books (if any) accordingly.

The above-mentioned features are not provided in currently available professional digital library software installed for handling library book transactions in physical libraries [1] [2].

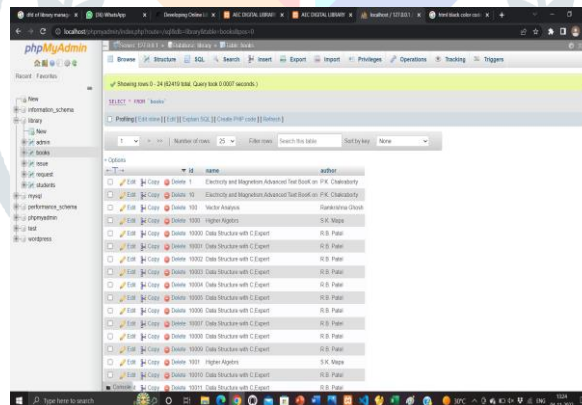


Fig. 2 Transactional database of a physical library book catalogue

IV. LIBRARY BOOK CACHING: RESOURCES AND METHOD

Library Book Caching System should be treated as a web-based add-on tool by the library software say, LibSys, LibMAN and KOHA developers which helps users (librarians) to manage heavy library issue-traffic queues within office hours on all week days. It can help user to manage issue-return transactions within defined constraints of limited human resources & allotted computers.

V. RESULTS AND DISCUSSION

The tool prototype already designed is ready for pilot testing. The system testing requires a separate dedicated server to keep track of caching requests from students and acknowledgment alerts back to students in the form of google mail and texting alerts with respect to tentative issue-return time slots. The users' unused (library) cards (having their roll numbers) need to be stored in dockets to flag the books cached near issue-return window space.

An appropriately configured server is intended to be installed to keep track of the following:

- Library user usage statistics can be easily inferred by counting the number of transaction requests sent by each enrolled library user of that organization.
- Library staff can easily assimilate daily (attended) book caching requests into log files.

- Also, daily book cache summaries in hard copy formats can be generated in order to communicate caching-requests to the issue section of the library for faster issue transactions serving long queues at the issue counter.

VI. CONCLUSION

Based on the popular laws postulated in 1931 by Indian librarian S. R., the physical libraries are ever-growing organisms in any organization and library sections are accountable to identify percentage issue statistics of books, also handling library transactions, saving the time of library users. The piece of work is a web-based project intended to be tested under constrained environments as discussed in the previous sections. The work has added benefits like the emulated environment can serve as an OPAC server, annual or semi-annual wise book verification process can be done at any time round the year. The participating authors feel that this concept, if embedded within professional digital library handling tools, shall help tracking the number of library visitors remotely accessing physical libraries in electronic mode.

The probable future scopes that can be anticipated from the developed prototype tool can be enumerated as:

- At times, if multiple counts of book caching requests for the same book title are found at the server, then the server must resolve the requests in a different way. Such a situation can arise in physical libraries of organization where there is constrained budget for library infrastructure and resources. In our case study, the books are shelved in less quantities while the library user count may increase.
- Another situation may arise when a library user receives two decline signals for his / her same book caching request. In such a case, the portal should prioritize the request by putting his / her entry in the next library slot in ACCEPT mode. This requires additional effort of re-ordering the book's availability count within the library. If done with this step, a message alert is passed to the library user to pick his / her cached book.
- Last but not the least, a lot of innovative efforts can be made in the mentioned tool prototype for adverse situations when a system needs to deal with x no of book caching requests all coming from a particular department (as per their to the weekly accessing slots of the library) and y count of caching book requests arrive at the console from other departments in priority.

REFERENCES

- [1] National Institute of Open Schooling, "Modern Library: Automated, Digital & Virtual", in, Library Information and Society, Union Government of India.
- [2] Jayesh Bansod, Meenal Katole, Sejal Sipani, Arpit Karmore, Ujwal Kalwala, Prof. P. C. Khanzode. (2022, May). Library Management Software. *International Journal of Creative Research Thoughts*. 10(5), 260-264. <https://ijcrt.org/papers/IJCRT2205725.pdf>.
- [3] Morium Morshed, "Open-Source Library Management System," Ph.D. dissertation, Abbrev. Dept. of Computer Science & Engineering, Abbrev. BRAC University, Dhaka, Bangladesh, Sep 2008.
- [4] University of Helsinki, Digital Library Services and Library Automation System, Feb 2016
- [5] LibSys Ltd, <https://www.libsys.co.in/products/rfid-deployments/library-automation>, June 2020
- [6] LiBMAN, <https://www.hasstechnologies.com/education-sector.php>
- [7] KOHA, <https://koha-community.org/>.
- [8] DSpace: <https://dspace.lyrasis.org/>.