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Development of an E-Content Database with Remote Access Facility Using Koha: A Case Study

Arup Dhara

Librarian, Ramsaday College, Amta, Howrah, India

arupdhara1979@gmail.com

ABSTRACT

With the rapid growth of digital learning and remote education, academic libraries are increasingly required to provide access to electronic content beyond physical library premises. Open-source Integrated Library Management Systems (ILMS) play a crucial role in enabling this transition. Koha, being the world's first open-source ILMS, offers flexible tools for managing, organizing, and delivering e-content securely to authenticated users. This article discusses the concept, need, architecture, and step-by-step implementation of an e-content database with remote login facility using Koha. The study highlights best practices, access control mechanisms, and advantages of adopting Koha for e-resource management in academic libraries.

KEYWORDS: Koha, E-Content, Remote Access, OPAC, Open-Source Software, Academic Libraries.

1. INTRODUCTION

The role of academic libraries has undergone a significant transformation in the digital era. The conventional dependence on print-based collections alone is no longer adequate to satisfy the evolving information needs of users, who increasingly rely on electronic resources such as e-books, e-journals, previous years' question papers, lecture notes, and institutional publications. Simultaneously, the growing adoption of online education, distance learning, and blended learning models has intensified the demand for seamless access to information anytime and from anywhere.

In response to these changing expectations, academic libraries are required to implement efficient and secure systems that support remote access to digital content while ensuring controlled use by authorized users. Koha, an open-source integrated library management system, offers a flexible, cost-effective, and customizable solution for managing both physical and electronic resources within a unified platform. This article examines the practical application of Koha in developing an organized e-content database with a login-based remote access facility for registered library members, highlighting its potential to enhance digital resource delivery in academic libraries.

2. CONCEPT OF E-CONTENT IN LIBRARIES

E-content refers to digital information resources that are accessible through electronic devices. In academic libraries, e-content typically includes:

- E-books (PDF, EPUB)
- Scanned chapters and notes (copyright-permitted)
- Question papers and syllabi
- Theses and dissertations
- Faculty publications
- Open access resources (NDLI, DOAB, e-ShodhSindhu, N-List links)

Proper organization and controlled access to e-content are essential to ensure ethical use, copyright compliance, and effective retrieval.

3. NEED FOR REMOTE ACCESS TO E-CONTENT

The following factors highlight the importance of remote access facilities in libraries:

- Growth of online and distance education
- Limited physical access during emergencies (pandemic, natural disasters)
- Increased demand for off-campus access by students and faculty
- Support for research and self-learning beyond library hours
- Compliance with NAAC, UGC, and DPI digital initiatives

Remote access ensures continuity of library services and enhances user satisfaction.

4. WHY WE USE KOHA FOR E-CONTENT MANAGEMENT

Advantages of using Koha as a repository software

- Completely free and open-source
- No vendor lock-in
- Customizable as per institutional needs
- Supports both print and digital resources
- Secure remote access for registered users
- Compliance with library standards
- Suitable for DPI, NAAC, and UGC documentation

5. OVERVIEW OF KOHA LIBRARY MANAGEMENT SYSTEM

Koha is a web-based, open-source Integrated Library Management System developed in 1999. It supports all core library operations such as acquisition, cataloguing, circulation, serials management, and OPAC (Online Public Access Catalogue).

Key Features of Koha Relevant to E-Content

- Web-based OPAC with user authentication
- MARC 21 compliant cataloguing
- Support for electronic resource linking (MARC 856 field)

- User-based access control
- Compatibility with open-source technologies (Linux, MySQL/MariaDB, Apache)

6. SYSTEM ARCHITECTURE FOR E-CONTENT ACCESS IN KOHA

The e-content access system using Koha consists of the following components:

1. **Koha Server** – Hosts the Koha application and database
2. **Web Server (Apache)** – Delivers content securely
3. **Database Server (MariaDB/MySQL)** – Stores bibliographic and user data
4. **OPAC Interface** – Allows users to search and access resources
5. **E-Content Storage** – Local server, institutional repository, or external links

Users authenticate through OPAC login, and access is granted based on membership credentials.

7. USER ACCESS AND SEARCH FACILITIES

Users can:

- Log in remotely using OPAC credentials
- Search e-content by title, author, subject, or keyword
- Access full text via embedded links
- Filter results using item type such as “E-Book” or “Online Resource”

This enhances discoverability and usability of digital collections.

8. Methodology: Setting Up E-Content Access in Koha

The system for providing controlled access to e-content through the Koha Library Management System was designed and developed by the author using a systematic and reproducible methodology. The approach combined bibliographic configuration, server-level storage, OPAC authentication, and access control mechanisms to ensure secure and policy-compliant access to digital resources.

In the first stage, the storage location for e-content was finalized. Since Koha links to electronic resources rather than storing them internally, three options were evaluated: local hosting on the Koha server, hosting on the institutional website or server, and linking to external scholarly platforms such as NDLI, DOAB, e-ShodhSindhu, and N-List. For greater control over access, availability, and compliance with institutional policy, local hosting on the Koha server was adopted.

To support secure remote access, OPAC login functionality was enabled through Koha system preferences. The OPAC was configured to allow public access while mandating user login for accessing full-text content. Strong password enforcement was also enabled to enhance security. These settings ensured that only authenticated users could access e-content from on-campus or off-campus locations.

Bibliographic records for electronic resources were then created using the cataloguing module in Koha. A dedicated bibliographic framework named *E-Resources* was created to distinguish electronic materials from print collections.

During cataloguing, standard MARC21 fields such as title (245), author (100), publisher (260/264), subject (650), and physical description (300) were populated. The MARC 856 field was used compulsorily to provide the URL of

the electronic resource, along with link text and a public note indicating restricted access. This ensured seamless integration of e-content with the OPAC interface.

For local hosting, a dedicated directory was created within the Koha instance to store digital files such as e-books, lecture notes, question papers, and institutional publications. The directory was created using the following command:

```
sudo mkdir -p /var/lib/koha/yourlibrary/htdocs/ebook
```

After creating the directory, the required e-content files were copied into it:

```
sudo cp book1.pdf /var/lib/koha/yourlibrary/htdocs/ebook/
```

To ensure that Koha and the Apache web server could access the files securely, appropriate ownership and permissions were assigned to the directory:

```
sudo chown -R koha-koha /var/lib/koha/yourlibrary/htdocs/
```

The presence of uploaded files was verified using:

```
ls -lh /var/lib/koha/yourlibrary/htdocs/ebook/
```

Once uploaded and configured, the files became accessible through OPAC links, for example:

```
http://opac.yourcollege.edu/ebook/book1.pdf
```

Access control was implemented as a critical component of the methodology. Initially, OPAC-based authentication was used, wherein users were required to log in before accessing e-content links. While this method provided basic protection, it was recognized that direct URL sharing could bypass OPAC-level restrictions. To address this limitation, an advanced access control mechanism was implemented at the Apache server level.

Directory-based authentication rules were applied in the Apache configuration to restrict access to the e-content directory. The following directive was added to prevent unauthorized access even if the URL was shared externally:

```
<Directory "/var/lib/koha/yourlibrary/htdocs/ebook">
    Require valid-user
</Directory>
```

After modifying the Apache configuration, the server was reloaded to activate the restrictions:

```
sudo systemctl reload apache2
```

This dual-layer access control mechanism—combining OPAC authentication with server-level restriction—ensured that e-content remained accessible only to authorized users.

Through this methodology, a secure, scalable, and policy-compliant e-content access system was successfully developed and integrated with the Koha OPAC, effectively supporting institutional teaching, learning, and research activities.

9. HIDING THE PHYSICAL ITEM REQUIREMENT

Koha is inherently designed to manage physical library materials, where access and circulation are governed by item-level records. However, electronic resources such as e-books, institutional PDFs, and subscribed digital content do not require physical representation. Enforcing physical item records for such resources is therefore redundant and may impede seamless access.

To address this limitation, Koha can be configured to allow electronic resources to be accessed independently of physical item records. This is achieved by modifying cataloguing practices and OPAC display settings so that e-content is presented as a directly accessible digital resource rather than as an unavailable physical item.

To decouple electronic resources from physical item dependencies, we have to follow following steps:

1. **Create an Electronic Resource Item Type:** Define a dedicated item type (e.g., *E-Resource*) with no circulation rules, fines, or barcode requirements.
2. **Suppress Item Availability Display:** Configure OPAC settings to hide physical availability details such as location, call number, and item status for electronic resources.
3. **Enable Bibliographic-Level Access:** Provide direct access links at the bibliographic level using MARC field 856, allowing users to access full text without relying on item records.
4. **Use Hidden Dummy Items (if required):** Where Koha mandates an item record, create a non-circulating, OPAC-suppressed dummy item with a generic location such as "Online."
5. **Optional OPAC Customisation:** Modify OPAC templates to hide item tables for e-resources and display clear labels such as "Online Resource."

This approach improves OPAC usability, reduces cataloguing overhead, and ensures reliable, location-independent access to electronic resources for authenticated users.

10. TESTING E-CONTENT ACCESS FROM OUTSIDE THE INSTITUTIONAL NETWORK

E-content access from outside the institutional network was tested as a critical validation step in implementing remote access through Koha. Although electronic resources functioned correctly within the campus network, off-campus access introduced additional challenges related to authentication, session handling, and secure file delivery. Therefore, external network testing was essential to ensure reliable and controlled access for remote users.

The primary objective of this testing was to verify that e-content was accessible only to authenticated users and that access controls functioned consistently regardless of user location. This process confirmed the effectiveness of OPAC login-based restrictions, server configuration, and download permissions. It ensured that anonymous users were unable to access full-text content, authentication mechanisms operated correctly; file links were not publicly exposed, and authorized users could download resources without errors.

Testing was conducted by accessing the Koha OPAC through mobile data or a non-institutional internet connection to simulate an off-campus environment. The tester logged in using valid student credentials to confirm successful authentication, session establishment, and role-based access control. After login, an e-content record was retrieved and the full-text link, configured through MARC field 856, was accessed to verify link visibility, correct redirection, and the absence of broken links.

A verification checklist was used to validate access restrictions and download functionality. The system prevented access to full-text links without login, redirected anonymous users to the authentication page, and blocked direct URL access. Additionally, files opened or downloaded successfully without permission or server errors, confirming correct server permissions and configuration.

External testing revealed issues that were not detected within the campus network, such as misconfigured authentication settings, incorrect file permissions, session redirection errors, and firewall or HTTPS-related restrictions. Identifying and resolving these issues at this stage ensured secure and uninterrupted access to e-content after deployment.

11. CREATING E-CONTENT SEARCH AND BROWSE FACILITIES

Efficient discovery of electronic resources requires dedicated search and browsing mechanisms in addition to secure access. In Koha, this can be achieved by assigning a specific collection code to e-content records and enabling targeted OPAC search strategies that separate electronic resources from physical collections.

A dedicated collection code is assigned using MARC field **942 $c** with the value **E-RESOURCES**, allowing all electronic records to be grouped under a distinct digital collection. This logical categorisation enables users to browse all e-content in a single view and supports consistent cataloguing and reporting practices.

OPAC search functionality is further enhanced through format-specific search strategies. Users may retrieve electronic resources using advanced search syntax such as **itype:EBOOK**, which filters results to display only digital content. The combined use of the collection code (**942 $c = E-RESOURCES**) and the electronic item type (**EBOOK**) creates a robust framework for efficient browsing, precise searching, and improved discoverability of e-content.

This configuration results in clear differentiation between electronic and print resources, faster access to digital materials, reduced user confusion, and an overall improvement in OPAC usability.

12. POLICY ON ACCESS AND USE OF E-CONTENT RESOURCES

During the development of the Koha-based e-content access system, an institutional policy was framed to ensure secure, ethical, and regulated use of electronic resources. The policy aimed to facilitate equitable academic access to e-content while complying with copyright provisions and regulatory requirements of the Department of Public Instruction (DPI), the National Assessment and Accreditation Council (NAAC), and the University Grants Commission (UGC).

The policy covered all electronic resources hosted, digitized, or linked through the Koha Library Management System, including e-books, scanned academic materials, institutional publications, and open-access learning resources. Access to e-content was restricted to registered institutional members through login-based authentication in the Koha OPAC, ensuring controlled and accountable usage.

Use of e-content was permitted exclusively for academic, educational, and research purposes. Commercial use and redistribution of resources through public platforms or file-sharing services were prohibited. The policy ensured adherence to national copyright laws and licensing conditions applicable to digitized and open-access resources.

To prevent misuse and support audit requirements, user authentication records and access logs were maintained within the Koha system and reviewed as required during DPI, NAAC, or UGC assessments. The policy was subject to periodic review by the Library Committee or IQAC to ensure continued relevance and regulatory alignment.

13. CHALLENGES AND SOLUTIONS

During the implementation and use of e-content access through the OPAC, several challenges were encountered. These challenges and the corresponding solutions adopted are described below.

Copyright issues emerged as a significant concern while providing access to digital resources. To address this challenge, only open-access materials and content obtained through proper permissions or licenses were used, ensuring compliance with copyright regulations.

Bandwidth limitations affected the smooth access of e-content, particularly in low-connectivity environments. This issue was mitigated by optimizing file sizes and configuring the server efficiently, which improved loading speed and reduced network strain.

A lack of user awareness and familiarity with OPAC-based e-content access was also observed. To overcome this challenge, regular OPAC orientation and user training programs were conducted to enhance users' digital literacy and effective utilization of available resources.

Security concerns related to unauthorized access and data protection posed another challenge. These concerns were addressed by enabling strong password policies and implementing secure HTTPS protocols, thereby ensuring safe and reliable access to e-content resources.

CONCLUSION

The implementation of an e-content database with remote login facility using Koha significantly enhances the scope and effectiveness of academic library services. By leveraging Koha's open-source architecture, libraries can provide secure, cost-effective, and user-friendly access to digital resources beyond physical boundaries. The system not only supports modern educational requirements but also aligns with national quality assurance frameworks. Koha thus emerges as a powerful tool for digital transformation in academic libraries.

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