Mobile Digital Rights Management for DSpace Open Source Institutional Repository

Adisak Sukul

***Abstract*— This paper describes the design and development of Digital Rights Management (DRM) for mobile application accessing the DSpace Repository.**

Since the repository comprise of both open-access and licensed documents, the DRM-Digital Rights Management system have been developed to manage the access policies, encode the documents and authorize user. There are also strict requirement from the documents owner that their documents have to store only on in-house datacenter, the system have to be hybrid cloud to meet requirements and maximize reliabilities. In this project we have also developed dedicated mobile appellations for Windows, iOS and Android devices.

***Index Terms*—DRM, Mobile application, Open source, DSpace.**

I. Introduction

Since March 2000, Massachusetts Institute of Technology (MIT) Libraries and Hewlett-Packard Labs have been collaborating on the development of an open source system called DSpace™ that functions as a repository for the digital research and educational material produced by members of a research university or organization.

Running such an institutionally-based, multidisciplinary repository is increasingly seen as a natural role for the libraries and archives of research and teaching organizations.

As their constituents produce increasing amounts of original material in digital formats, the repository play an important role of new media in education system.

However, the present behaviors of internet media access, including educational media, have continuing evolve. The number mobile devices have become substantially increased and dramatically reduced in cost.

The heart of DSpace is a free and open source (FOSS) storage and retrieval system, which allows the repository to be scalable and customizable. Potentially, DSpace will lead to the creation of a virtual library that meshes the collections of various research libraries. DSpace repository has OAI-PMH built-in which means that it is ready to communicate with other repositories, thereby making future cooperation of different legislative departments with other libraries very easy.

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The House of Representatives of Thailand, providing access to legislative information is of great interest to the Secretariat of The House of Representatives. The information consists of complex official documents from various legislative processes and a compilation of materials generated at each legislative stage. The materials are inter-related and cross-reference each other. It was crucial to find the right mechanism to manage these materials to ensure access and support developmental goals.

The case study demonstrates the design and development of large digital library for educational collection in Thailand. It is provide access to millions of digital items, including legislative documents and related e-books, journals, newspapers, videos for the country wide access. As the number and size of documents grow dramatically every year, we need a scalable yet reliable system to handle this massive load. The working group chose to substantially extend the DSpace, an open source repository system, to serve as a cost effective core repository system. Along with 10+ private cloud instance for server farm infrastructure, Google Search Appliance for the search engine front-end, LDAP server is implemented as main authentication service, a Digital Rights Management system to authorize user access, web and mobile client to allow patrons to download and access digital contents off-line via Windows, iPad and Android devices.

II. Implementation Details

The National Assembly of Thailand Digital Library project is comprised of a numbers of modules: DSpace for the repository, 10+ cluster nodes for server farm infrastructure, Google Search Appliance for the search engine frontend, a Digital Rights Management system to authorize user access, web and mobile client to allow patrons to download and access digital contents off-line via Windows, iPad, iPhone and any Android devices.

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Even though DSpace has a lot of great functionality which fully met the requirements of this project, further development of the software in various modules needed to be done. For example, for the search function it was necessary to use a third party module. So it was decided to implement Google search instead, We chose the Google Search Appliance to fill the gap, the very first implementation in Thailand, and it did the job very well.

This project will support the work of Parliament's members, Commissioners, Government Officers, and all stakeholders. It will also raise the visibility of the Legislative Institutional Repository by employing the newest IT solutions to publish the legislation knowledge to the people.

For the Mobile perspective, which is becoming very important client for off-line accessing the content these days, applications need to be developed correctly and effectively cooperate with the DRM and also with the main repository system. The mobile applications need to response to all functions and policy from the DRM server, i.e. document lending policy, dynamic watermarking, expiration policy, save/print policy and most important is the document have to kept encoded at all time in any user devices.

III. System Structure

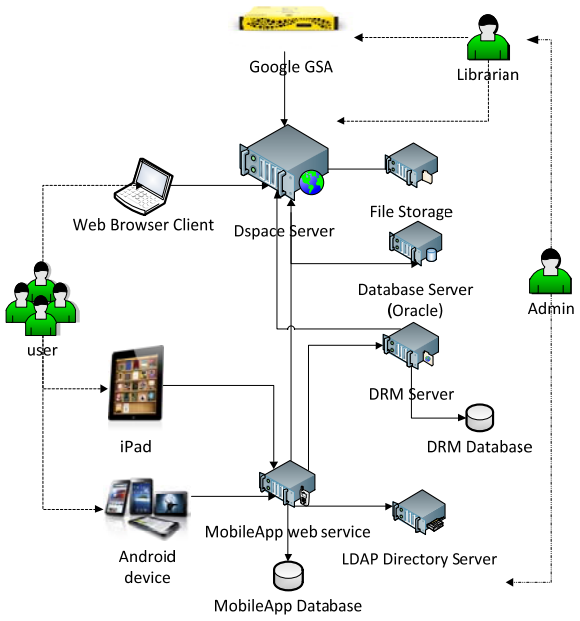

Fig.1. LIRT- System structure.

LIRT - Legislative Institutional Repository of Thailand system structure comprise of multiple component. Multiple user experiences are provided by the LIRT system, including Web Browser Client, iPad (iOS) and Android devices. Following of this paper will explain by flowchart and display screen capture of LIRT mobile applications.

IV. Mobile Application Process

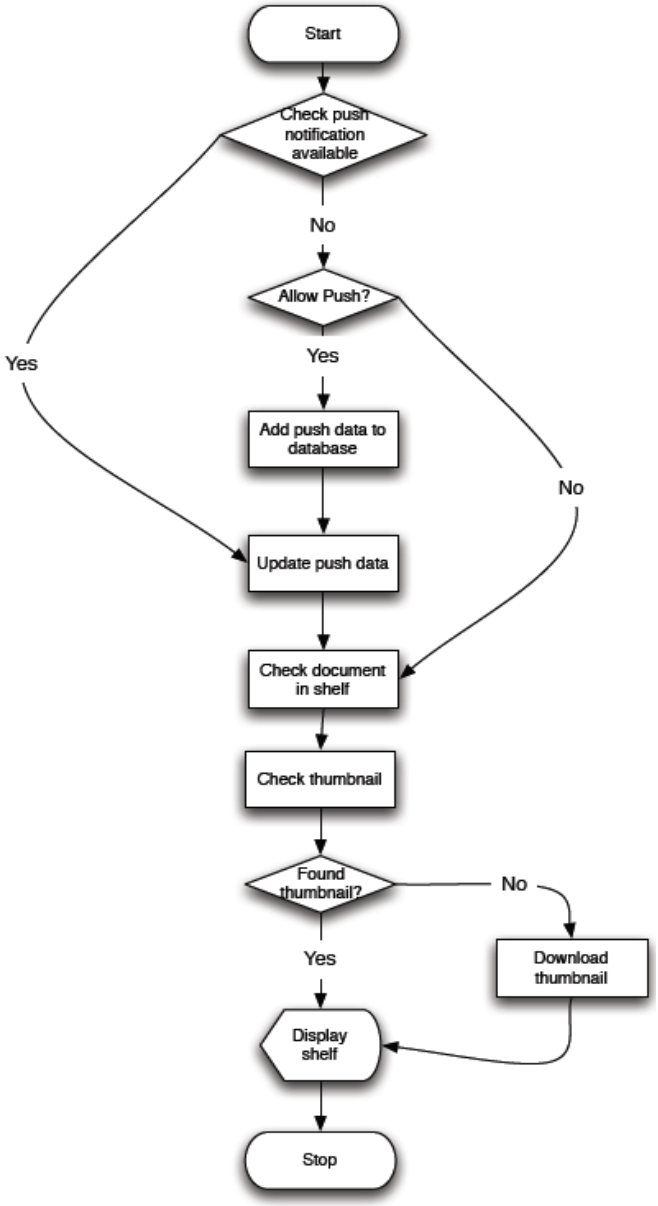

Fig. 2. Flowchart of mobile application startup process.

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Fig.3. LIRT user experience through Android browser.

Fig. 4. LIRT iPad application startup screen with bookshelf.

Fig. 5. LIRT iPad application displaying document (normal reading).

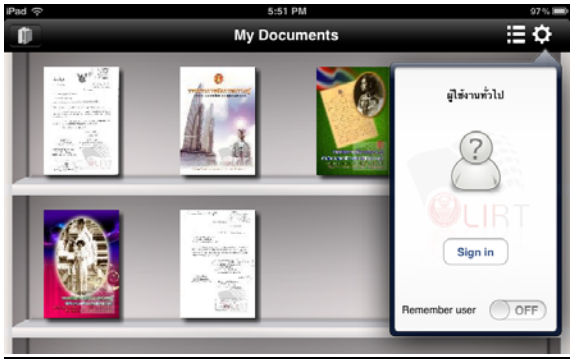

Fig. 6. Flowchart of user sign-in with LDAP server through mobile application.

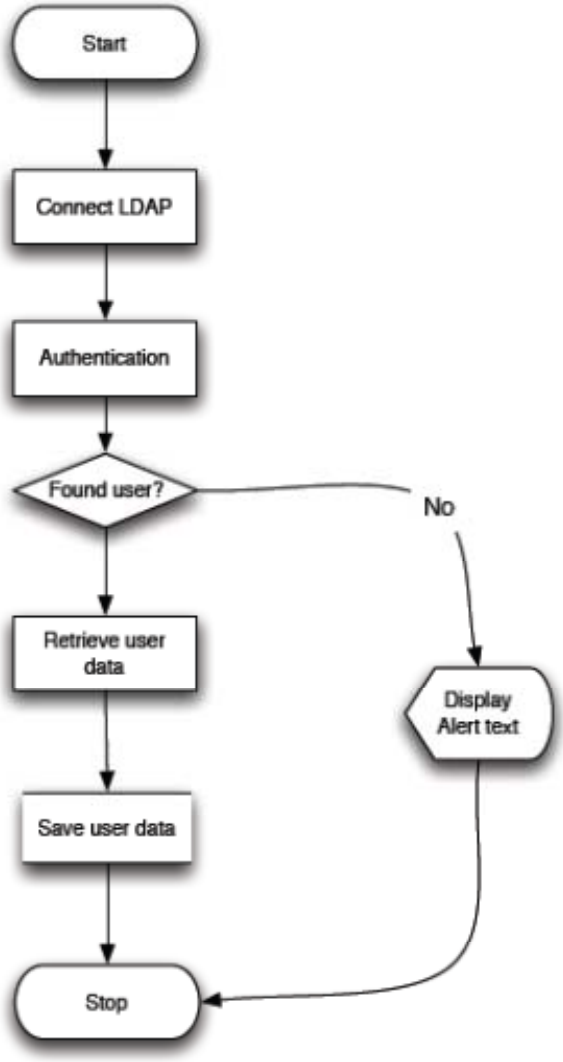

Fig. 7. Flowchart of user sign-in with LDAP server through mobile application.

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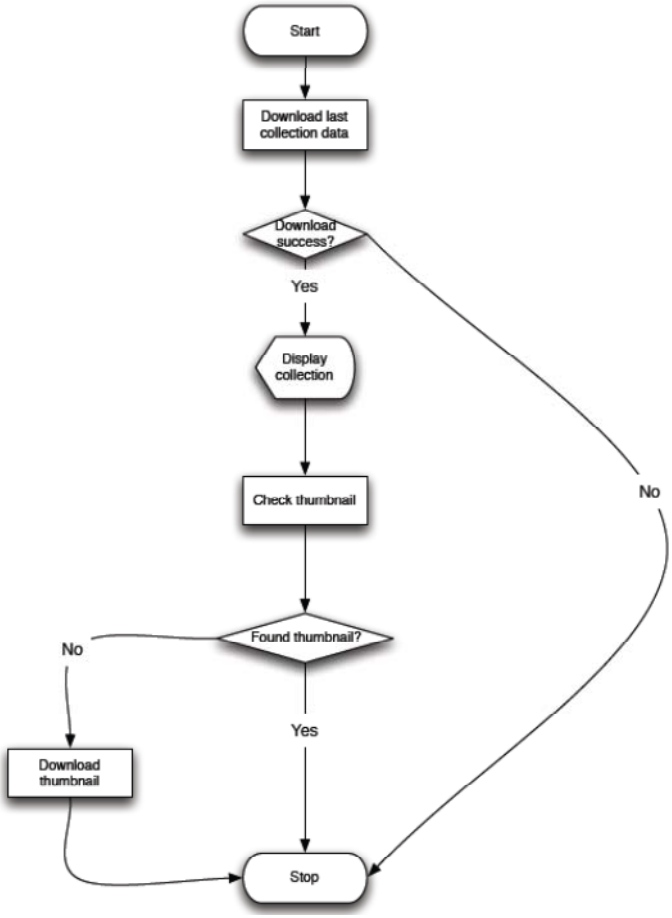

Fig. 8. Flowchart of mobile application document browsing process.

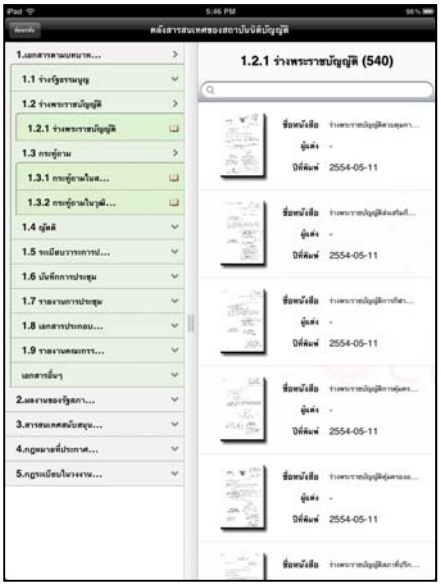

Fig. 9. Mobile application interface with Google Search Appliance API.

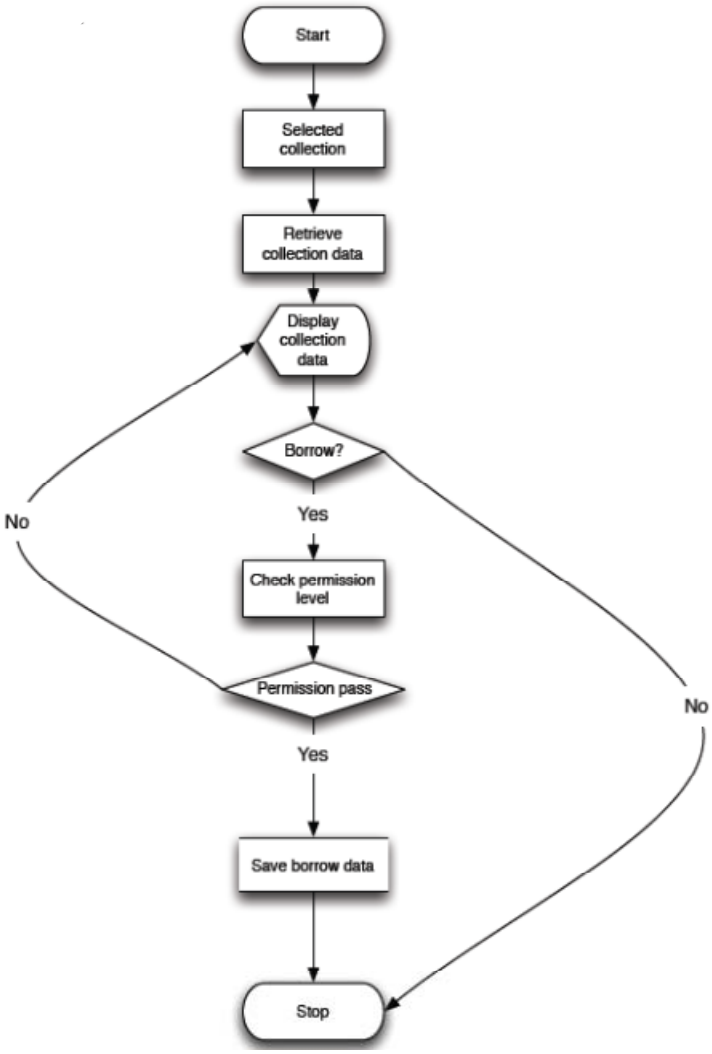

Fig. 10. Flowchart of checkout document process with DRM server through mobile application.

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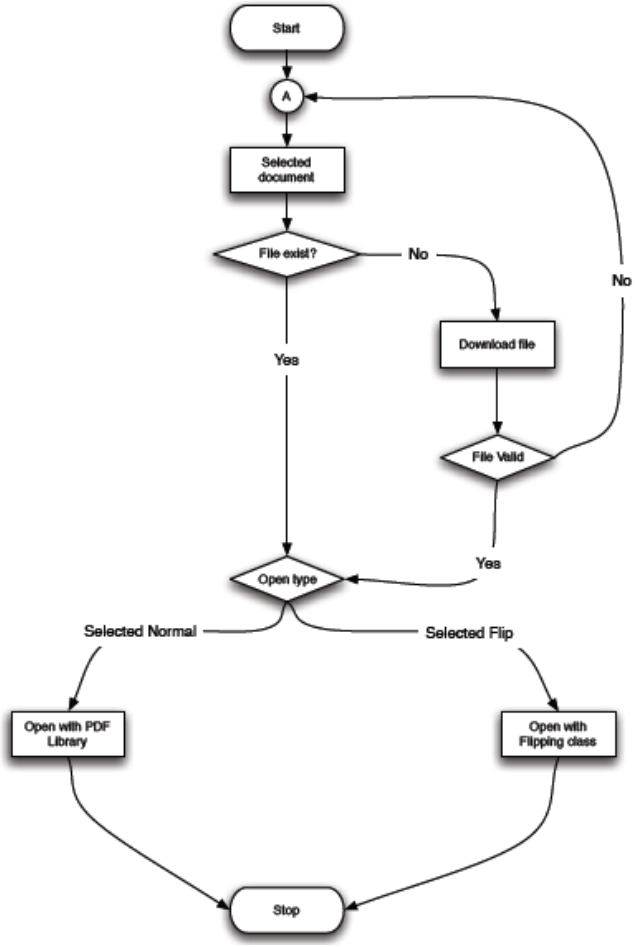

Fig. 11. Flowchart of mobile application document verification and display process.

Fig. 12. LIRT Android application displaying document.

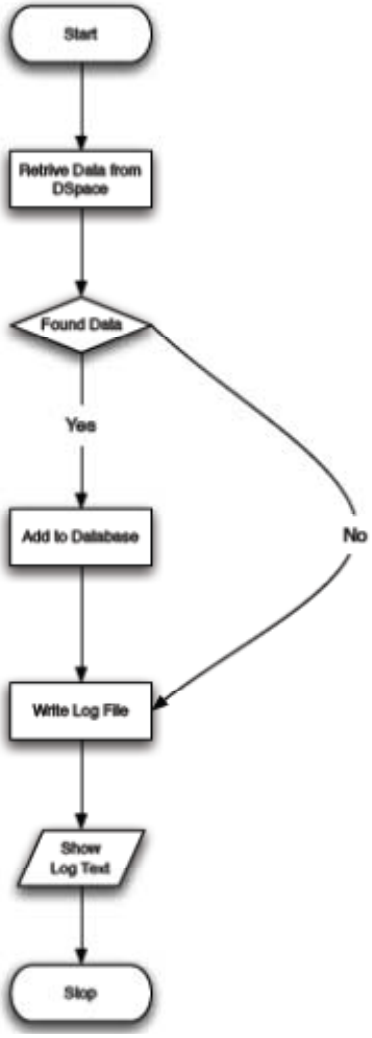

Fig. 13. Flowchart of MobileApp web service document updating process with DSpace.

V. Conclusion

This paper described and demonstrated the system structure, flowchart and screen capture of a mobile application for accessing the digital library for legislative collection in Thailand, called LIRT- Legislative Institutional Repository of Thailand. It is providing access to millions of digital items, including legislative documents and related e-books, journals, newspapers, for nationwide access.

From the mobile perspective, a mobile applications need to be developed correctly and effectively cooperate with the DRM and also with the main repository system. The mobile applications need to cooperate with all functions and policy from the DRM server, i.e. document lending policy, dynamic watermarking, expiration policy, save/print policy and most

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