



E-Library using the Mobile OPAC

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ABSTRACT

In the today's Communication world, mobile and its applications are the most emerging trends. Mobile applications are the exact replacements of web based applications. Based on this statistics we are planning to migrate web based application of college library to mobile application.

In most of the college website we see applications like latest news, Attendance, Login and Registrations, EBooks, Forums, Results, Chat application, Web Mail, etc.. Based on the same we would do the same thing in a mobile application. The reason behind the work is that the mobile applications do not need any third party browsers, or they don't need any domain registration. So in order to take the advantages of all this limitations we are planning to develop the mobile applications. Now the main important modules that I want to implement on my mobile application is OPAC (Online Public Access Catalogue) for a library account.

Using OPAC mechanism in mobile one can just access the library account of his/her from anywhere using his mobile device, So that they can check the availability of books in the library instead of going to library. They can even check the number of books that are taken in there account and its submission date, fine to be paid in case.

KEY TERMS

Mobile application, Web Application, OPAC Systems, Information retrieval.

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INTRODUCTION

The Concept of OPAC is already implemented in web based applications. The main challenge for us is to implement the OPAC in Mobile Based Applications. The growth and development of Information Retrieval is rapid in today's world. The Growth of Mobile Devices manufacturing and its usage is also rapid. So putting both the statistics of Mobile Devices and Information retrieval, we took a step to introduce the information retrieval system using OPAC in Mobile devices.

OPAC is a gateway to access library services remotely. OPAC provides the users online access to the library providing an option for searching the exact resource he is looking for and retrieve it upon successful search. Based on the library Management, OPAC can also provide some extra features like checking already borrowed resources, reserving for a particular resources in advance, etc. Several changes have taken place and OPACs have improved significantly since then. The 3rd generation OPACs incorporates features that are characterized by the facilities of World Wide Web (WWW). Now the major Goal is to integrate the above features of OPAC into mobile application. The major Challenge in the Library management is that there will be vast collections of Books, Journals, Newspapers, etc. All these must be categorized perfectly, so that searching function can be done exactly with appropriate results. But this categorization will be varying when compared to different libraries. For Example if consider University libraries, the books are categorized based on the streams of studies. But where as if we go for central libraries the books are categorized based on similarity of technology and relativity, like all Novels are under one category, all electronics related books will be under one category. So the main challenge in building the OPAC is mobile is that we need to have the categorization, so that we can reduce the search cost and effort on the mobile device

HISTORY

In the early 1980s, catalogues only displayed the bibliographic information for monographs and serial titles physically held in a library (Norgard et al., 1993).

Baker and Lancaster (1991) noted that library catalogue use has increased and has important two aspects. First, librarians are becoming more concerned with the evaluation of library services in general; they want to know how well the catalogue performs, what are its deficiencies, and how effectiveness can be increased. Secondly, many libraries are replacing traditional card catalogues with OPACs [5].

The computerized catalogue is commonly referred to Online Public Access Catalogue (OPAC) (Chen, 1991). There is no clear definition of the online catalogue [4]. It has been defined in various ways by libraries and there is little consensus about what really constitutes an online catalogue [3].

The Library of Congress has defined the online catalogue as:

An online catalogue is an access tool and resources guide to the collections of a library or libraries, which contains interrelated sets of bibliographic data in machine-readable form and, which can be searched interactively on a terminal by users (Fayen, 1983, p 4).

The National Library of Medicine's definition is as follows:

An online catalogue provides online access to the complete bibliographic record of all of the library's holdings with minimal access points being the same as those available in a card catalogue (Fayen, 1983. p 4).

WEB PAC

OPAC system build on a web based application is known as Web PAC. In Web PAC we connect to the libraries remotely via Graphical browser. Web OPAC is the same as OPAC. The functionality remains same. The difference we see in both of them is Web OPAC is global and any one can use it form anywhere. The operations searching and retrieving are same. The result is also same pre-coordinated and post-coordinated search results. Here we will use html files and the results are of hyperlink type in Web OPAC. There are two types of Web OPACs. Below is the brief description on them with the architecture diagrams

The traditional public catalogue is converted to web-interface; here we use the HTML files for performing the operations over a graphical browser. In this process we don't have any 3 Part Communication bridge to communicate directly to Catalogues we just connect to the server, which intern will connect to all the catalogues. Fig 1. Shows the architecture of the traditional system.

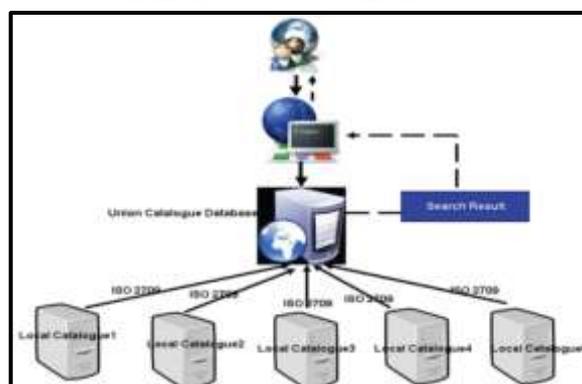


Fig 1: General Web OPAC Architecture

(i) The Second Catalogue System which takes the advantages of Z39.50 protocol, which is a powerful communication tool based on client-server interaction search interface to the catalogue and other resources on the net. Below picture clearly represents the same.

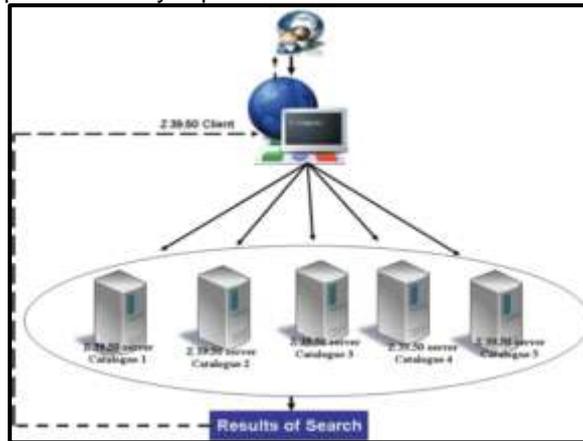


Fig 2: Z39.50 Based Web OPAC Architecture

Mobile OPAC:

Mobile OPAC is OPAC system which is implemented over a mobile device as an application. The major challenge here is that the mobile devices will be having limited resources (CPU & memory). So we need to develop the application by considering the above limitations.

There are two ways of implementing the OPAC in Mobile:

1. In-Mobile Processing (II – Tier):
2. External Processing (III – Tier):

In-Mobile Processing:

Internal processing is the basic method, which follows basic 2-tier Architecture. Here we will be having the Mobile Apps (Client), Hosting server (Catalogue DB). Now Here the Mobile application has to process all the inputs and outputs, the overhead will be on mobile device. Consider that, if the user is signing in, the Authentication must be performed at the Application end, both Client-side and server-side. Once he is in, he searches for the resource, the processing begins at the mobile application, it need to run the sql query to fetch the information from the Database, once the information is fetched it has to be filtered and processed to show the exact results. So the overhead must be handled by the Mobile Device. For this we need high end mobile devices, which has high RAM and Processor Capacity. Fig 3 represents the abstract view of the internal Processing Methodology.



Fig 3: Mobile OPAC: Internal Processing Method

External Processing:

In order to decrease the overhead on the mobile device we suggest shifting the business logic to an external source, which will do all the processing and return the exact results at the end to display as shown in Fig 4. As the processing is done on the third party component hence this mechanism is called Third Party Processing. Here the third party can be the web service, dll etc., which receives the request from the mobile object, upon request the third party component will access the database and process the search query and returns the exact results to the user.

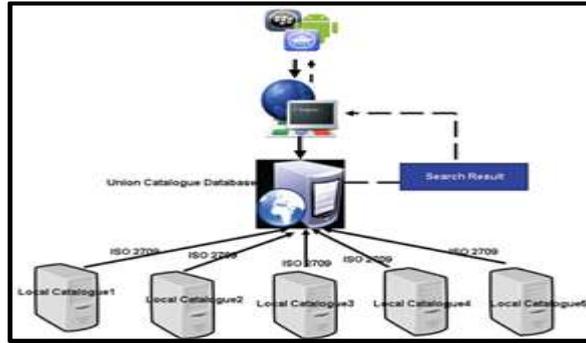


Fig 4: Mobile OPAC: Third Processing Method

Architecture of Mobile Application:

Mobile OPAC is different from the Web OPAC, The Architecture of the mobile OPAC is shown in Fig 5.

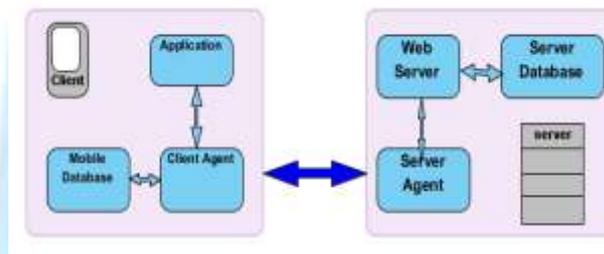


Fig 5: Architecture of Mobile Application Processing

In above architecture diagram we can see that we have both client side as well as server side components.

Client Side Components:

Application: Application at client end is the mobile application through which the user interacts to submit the request and checks out the response.

Mobile Database: Mobile Database at the client side is the light weight small database which stores the user's information like history, preferences, etc...

Client Agent: Client Agent is heart of the Client which helps in communication between Client database and the Server Database and Application and web server. It collects the requests from the Client database or Application and sends it to Server Agent.

Server Side Components:

At the server side also we have three components similar to Client components.

Server Agent: Server agent is similar to Client agent, the only difference is that client agent works at client side and the server agent works at server side. The server agent collect the requests from the Client agent and then it will forward it to either web server or server Database for processing. Once the response is generated the server agent passes it to Client agent.

Web server: Web server handles the business logic of the application, As we already discussed in Third party processing method, the business logic of the application will moved from the application and placed in the web server.

Server Database: Server database is the main database where the data of all the users, and the transactions, etc will be stored here.

The exact processing how this mechanism works is as follows.

User will login via Mobile App. The App will do client side validation and send the request for the Third party Component to Authenticate the User.

Now the Component will access the Database and will check whether the user is authenticated or not.

If the user is not authenticated the the error message is sent as response. At the Client end the user will get the same message.

If user is authenticated then the component will send authentication access as response. Now the user can do his necessary operations like searching and checking his account.

Now if suppose the User enter a search Keyword, The request will be sent to the third party Component for the further processing instead of database to fetch the results.



The processing may include the basic information retrieval methods like stemming, Identifying tokens, thesaurus generation, submitting the query to database to fetch the results, etc.

The database will execute the queries and it will send the extracted data to the Component, but not to the mobile device application.

Now the Component will work on that retrieved data, to filter, organize, align and then it will send the response to the Mobile device application.

Now the user can see the results on his device via the application.

The below block diagram will represent abstract view of the above mentioned procedure:

CHALLENGES AND LIMITATIONS

The Major challenges and limitations of this Mobile OPAC are:

If we go with the Internal Processing Mechanism we need to have the high processing phones.

If we go with the Third party Processing, Then we need to have some third party tool, which is external to the device, which can process the request,

Using web services as third party can be done. This is the best way but need to maintain the server for this.

We can have .dll files as a component which will process the request. But .dll files are supported only in Windows platform. So need Pay for it.

The last limitation is the processing time will be high as the round trip is going on and the third part component is there in between.

EDITORIAL POLICY

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CONCLUSION

So finally the bottom line of the paper is that we recommend having the mobile application as a replacement for the web based application in all aspects of the world

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