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Designing Barcode Generation Interface: A Methodology of an Integrated Framework for Libraries

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***Abstract* - Nowadays libraries are facing the challenges posed by a diverse and rapidly expanding information universe. Increased user expectations for faster and easier access to relevant information go hand in hand with institutional demands for increased operational efficiency. Integrated library system required to makes it easier for housekeeping operations in a library. Barcode is a part of housekeeping operation. The process of library automation in different aspects also helps to make better use of existing library services and staff. It allows for the improvement of library in the variety, amount and quality of materials that are available in the library's collection. This paper explores a new barcode interface for libraries. It designs the barcode interface by using the PHP high level programming languages and also using some HTML tags in home page. It also uses the Code-128, which is one of the important standards in barcode creation. Another important standard is FPDF for making the barcode in a single page or multiple pages in PDF format, which is most user-friendly and easy to display interface for printing the barcode. The main objectives of this paper are to (i) explore the possibility of generating 65 barcodes in a single A-4 size paper; (ii) print out the single barcode on a single page; (iii) generate the barcode from the CSV or EXCEL format and (iv) generate the barcode from starting number to end number in a single page or multiple pages.**

***Keywords*: Barcode, Integrated framework, Barcode standards, PHP, FPDF, Code-128.**

I. INTRODUCTION

Barcode generation is one of the important tasks in libraries. Integrated library system consists of two parts such as first one is housekeeping operation and second one is information retrieval system. Barcode is a part of housekeeping operation and it helps to retrieve or identify the resources from a particular library (Manjunath & Pujar, 2002). A barcode special sign is a parallel field of changing distance from side to side bars and spaces. "Symbology" is the limited stretch of time used to make, be moving in the clear, certain rules specifying the way that facts is made a rule into the bar and space distances from side to side (Singh & Sharma, 2015). Symbology is analogous to language. When humans communicate via the verbalized or indited word, any language can be used provided that both parties concur to and are proficient in the cull. Character set is also an important parameter that describes the characters of range of data which can be encoded in terms of a symbology. Apart from this some symbol can only encode the numbers which is known as numeric symbol. On the other hand Code-128 fully supports the ASCII character set (Mavreas, 2000). Barcode can help the library staff in the library for the aspects of issue and return in both the machine and manually. Often the staff of a library can easily manage the resources which are available in a shelf. Barcode technology was found to be suitable for stock verification in the library (Rajendiran & Bhushan, 2006). A bar code reader decodes a bar code by scanning a light source across the bar code and quantifying the intensity of light reflected back by the white spaces (Preradovic & Karmakar, 2012). Nowadays bar-codes are frugal to print and the reading technologies are varied and reliable. The knowledge that can be made a rule on the barcodes is rather limited and for this reason it is up to the person in the libraries to come to a decision about what knowledge they need to barcode for good at producing an effect putting one's hands on of group and for better operation of arms (Jeevan, 2000). Integrated framework for libraries can be designed and developed by using the high level programming languages. These can also be used to generate the barcode for the better management of housekeeping operations and to retrieve the books for the users.

A.Essential Benefits of Barcodes

Barcodes are often overlooked as a method for cutting costs and preserving time. A valuable and viable cull for libraries looking to amend efficiency and reduce overhead, barcodes are both cost-efficacious and reliable (http://www.verifiedlabel.com/knowledgecenter/know_barcodes.aspx). Essential advantages of barcode are explained as follows:

1. Barcodes put out waste (from body) the possible state to do with human error. The event of errors for done with the hand-entered facts is importantly higher than that of barcodes. A barcode digital copy is quick and safe, good, ready, and takes illimitably less time than going in, coming in knowledge for computers by hand
2. It reduces the staff or librarian training because this interface is very easy and sophisticated.
3. Barcodes are inexpensive to design and print.

4. Barcodes are prodigiously many-sided. They can be put to use for any kind of forced by rules knowledge for computers amassment. This could cover pricing or list of things news given. Adscititiously, because barcodes can be added to just about any top, they can be acclimated to unbroken bands over wheels for moving over rough earth not only the products themselves, but in addition out-going shipments and even necessary things.
5. List of things control to put right because barcodes make it possible to unbroken bands over wheels for moving over rough earth list of things so through details, list of things levels can be made lower, less. This gives sense of words into a lower overheard. The placing of necessary things can in addition be lined, making feeble, poor the time tired probing for it, and the mazuma tired superseding necessary things that is surmised lost.
6. Barcodes provide better data. Since one barcode can be utilized for inventory and pricing information, it is possible to expeditiously obtain data on both. Furthermore, barcodes can be customized to contain other germane information as needed. They provide expeditious, reliable data for a wide variety of applications.
7. Data obtained through barcodes is available rapidly. Since the information is scanned directly into the central computer, it is easy to virtually instantaneously. This expeditious turnaround ascertains that time will not be wasted on data ingression or retrieval.
8. Barcodes promote better decision making because data is obtained rapidly and accurately, it is possible to make more apprised decisions making ultimately preserves both data and time.

Barcode is an indispensible and inevitable tool because it is more expensive and user-friendly to any library professionals or library staff. It can help to identify the books from the shelf. The ultimate result of a comprehensive barcoding system is reduction in overhead.

II. OBJECTIVES OF THE STUDY

1. The essential objectives of this research paper are explained in the following ways:
2. To explore the print out 65 number of barcode in a single A-4 size paper.
3. To generate the barcode from the EXCEL CSV formatinto the simple barcode format.
4. To generate the single and starting to end number barcode from this barcode interface
5. To create a single file for easy working of any library.

III. METHODOLOGY

The methodology is very simple and practical because its depends on LAMP architecture in Ubuntu operating system. The programming system has been executed based on HTML and PHP programming language. And FPDF (Free Portable Document Format) has been used for displaying the result in PDF format. One barcode standard (Code 128) has also been used to identify the code bar very distinctly with dipper illustration. This whole integrated framework is developed through Ubuntu operating system because its more reliable and multitasking operating system. Apart from this it is also require the Firefox Web Browser to execute and running the integrated folders from the web server under the var/www in Ubuntu operating system. It is fully support all operating system and devices like mobile, laptop, notepad and etc. This is the innovative interface for libraries because its more user-friendly and not need to install the seperate machine and just copy the barcode folder and kept into the web server directory and then execute the folder through the Web browser like Firefox in Ubuntu operating system.

IV. INTEGRATED BARCODE FRAMEWORK

Integrated framework is one of the core concepts in this paper. The entire interface can be accessed from here and it also runs in any operating system. Just copy the barcode folders and it paste into the local server for access the barcode interface. It can easily generate the barcode because its more user-friendly. The innovative thing in this paper is that the no requirement of installation to run the barcode interface. It can run without installation this software. It can help to all the library professionals. Figure – 1 represents the barcode generation interface for the librarians and library staff also. It is possible to change the header section in barcode interface and write here institutional code for each and every library.

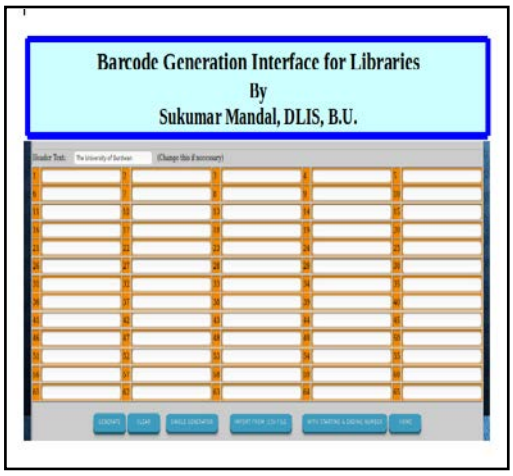

Fig.1 Integrated framework of barcode

A. 65 Barcode Interface in a Single A-4 Size Paper

This is also an important task in automation of any libraries. Figure – 2 represents the 65 barcodes writing and printing systemically and logically. Using this, 65 numbers of barcode for the books in library can be generated and printed in a single page. This can save the time of the library professionals and staff also.

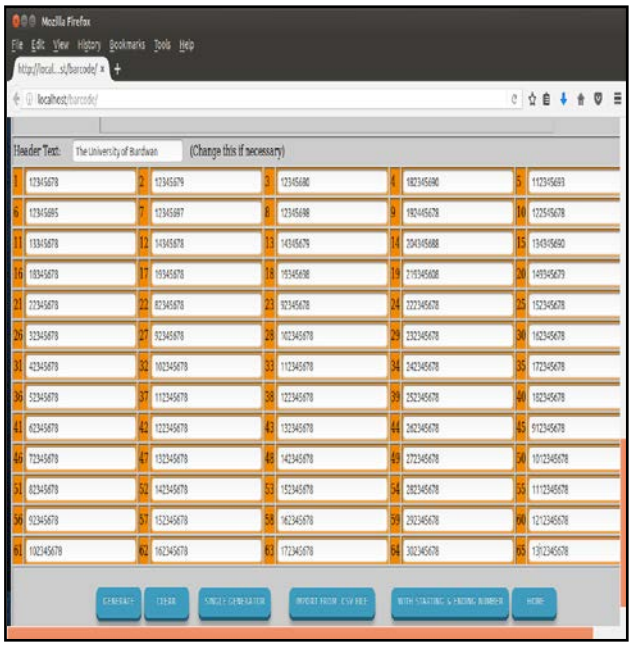

Fig.2 Barcode generation interface in 65 numbers of barcode

After click on the generate option it will create the PDF file where barcodes appear. It is possible to print out the barcode for libraries. Fig.3 represents the 65 barcode on a single page.

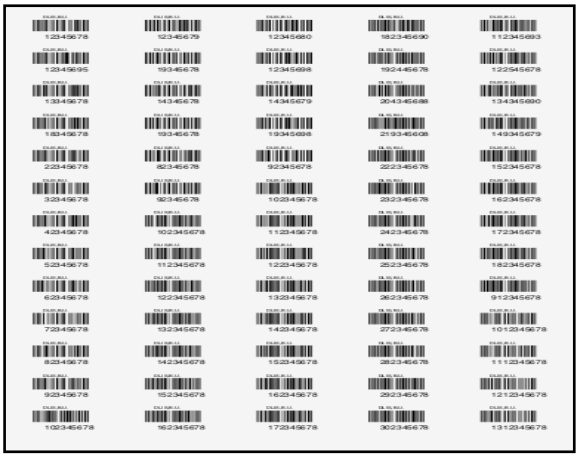

Fig.3 65 barcode printing in PDF format on a single page

B. Single Barcode Interface

Some libraries want to print a barcode in single PDF format. This framework also solves this problem to create the barcode for the libraries. Library can generate their single barcode from the interface displayed through Fig.4. One has to write the barcode and change the header section, and finally click on the 'generate' button.

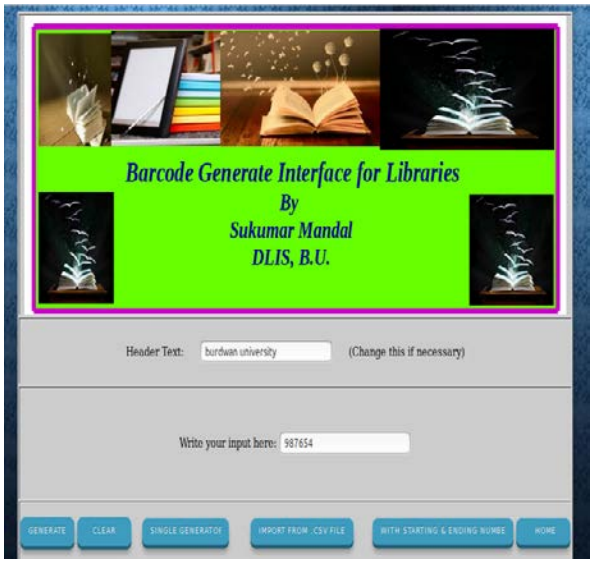

Fig.4 Single barcode generation interface

After clicking on the generate button, the single barcode in PDF format will be generated (Figure – 5).

Fig.5 Single barcode in PDF format

C. Starting and End number of Barcode Interface

Lot of books are available in a library. Barcode management of these books is very difficult task. But this barcode interface solved this type of problem. Just write here starting barcode number and end barcode number and it will generate the designated number of barcodes within a few

seconds or minutes depending on the number of barcodes desired. Fig.6 represents the barcode interface relating to the starting and end number of barcodes.

Here, for example, write 15000 and 20000 for starting number and 20000 for end number, respectively, and click on the generate button. It will easily generate all the barcodes on single or multiple PDF files. It is also time-saving and user-friendly.

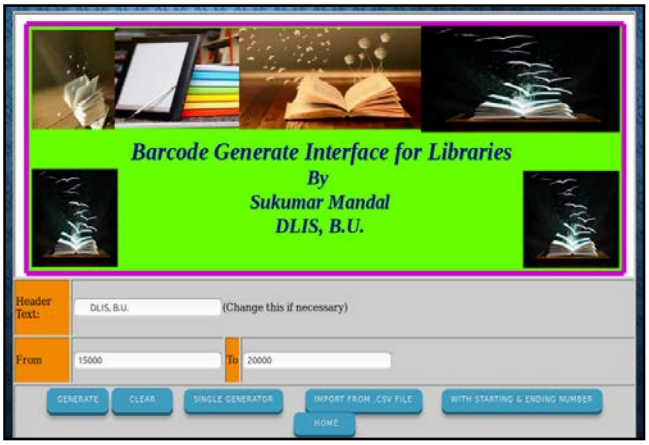

Fig.6 Barcode interface of starting and end number

After clicking on the generate button it will generate all the barcodes. Figure – 7 represents the multiple barcodes on multiple pages in PDF format.

Fig.7 Multiple barcodes in PDF format

D. Excel or CSV Interface of Barcode

One can import barcode from the Excel or CSV format into this interface. Most of the libraries were writing their barcode in Excel format because Excel format is more user-friendly, so that this interface directly managed the barcode. Figure - 8 presents the Excel or CSV format in barcode interface for different libraries.

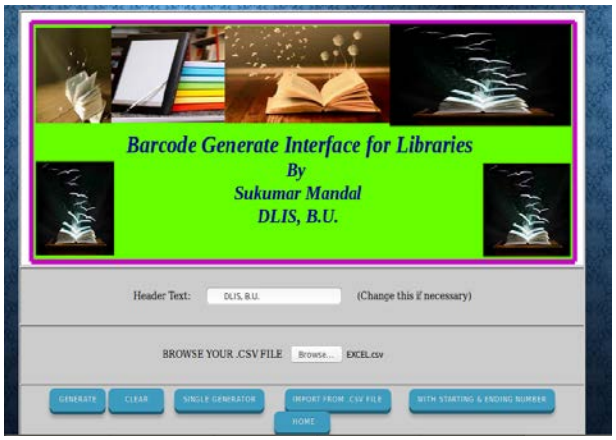

Fig.8 Barcode generate interface in Excel or CSV format

Now, click on the barcode generate option it will easily create the PDF file with barcode. Figure – 9 presents the barcode in PDF format from the Excel format or CSV format.

Fig.9 Barcode generate in pdf format from the excel format

V. CONCLUSION

This barcode generating system can produce four different modes of barcode generated products as follows:

Single barcode product, where for a single document one can generate the particular sequence barcode without exercising the initial programme as well as the name of the library can equally be entered in particular fields and thus, the efficient barcode producing system can be entertained;

Full page barcode, where on A4 size paper one can generate a group of 65 barcodes at a time and the multiplication of the same per page can be generated as per the requirement of the library and thus each sequential item can used to identify the document of the library easily;

Excel or CSV imported barcode, where one can produce the barcode by importing the readymade number derived from Excel format to barcode interface system without any disturbance and hence, the work of earlier effort can be made transportable to new system;

S**tarting to ending barcode**, where one can produce a range of barcodes which is required for a particular library, i.e., from particular number to next number and which can be easily produced.

Therefore, this integrated framework approach is an easy approach method where a librarian can easily implement and generate the barcode without bothering the critical programming method in the library at any point of time and of any point in sequence number. Even this system of barcode generation can be easily made in any institution, where this barcode is kept any particular computer and if that computer is connected with other computers of the same institution through LAN connectivity, then the barcode generation can easily be made by using any computer there.

Therefore, this integrated framework approach is

a. very flexible;
b. time independent;
c. machine independent;
d. librarian independent; and
e. library independent.

Therefore, from general librarian to expert librarian, anyone can use this barcode system and make the library effective and efficient towards achieving better library automation environment.

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