Barcoding for Faster Library Transactions

V.K.J. Jeevan

ABSTRACT

The utility of barcoding for faster library transactions is time-tested, and more and more computerised libraries in our country are using this technology. The paper briefly outlines the applications of this technology for library work. The barcode data transfer works in perfect harmony with library databases and can be used for faster and efficient library transactions. Various hardware, software, and symbologies are explained. A case study on application of barcode technology at the Central Library of Indian Institute of Technology, Kharagpur, is elaborated. The paper also highlights the future applications of this technology in the information workplace. An indicative list of local barcode solution providers is also provided.

1. INTRODUCTION

The circulation work in an automated library involves keying in a large amount of data. Sometimes, the library staff at the counter has to retype the same information due to error in data entry. All this results in long queues at the circulation desk in our libraries. This voluminous work can be handled in a smooth manner in a much less time by the application of barcoding, one of the simplest coding technologies available in the market. The speed of data capture is three times faster than the speed at which a skilled data entry operator can input data[1] and also the error rate is negligibly small[2].

The barcode technology originated out of the need of retail stores and big industries to track down their inventory errors in a faster way. Due to the cheap human labour available in our country, the estimated barcoding market was a mere 12 crores in 1995-96[3], out of which libraries and miscellaneous services accounted for only 1 crore. Libraries need to adopt this technology as it helps retrieve and collect data quickly and efficiently.

2. BARCODE DATA TRANSFER

The information that can be encoded on the barcodes is rather limited and hence it is up to the individual libraries to decide what information they need to barcode for efficient handling of collection and for better operation of services. Libraries can use accession numbers of books, the unique information that distinguish their collection, as the vital information entity to barcode their collection. Similarly, the identification number of a user stands distinct for each member, which can be used to barcode the user's cards. Accession number/borrower number exported from the library database/borrower database is converted to a series of black and white lines by the barcode software. This can be printed by a dot-matrix/laser printer and pasted on all books and borrower cards.

The light beam flashed from the barcode scanner on the barcode label undergoes reflection at the white lines and absorption on the dark bands. This reflected light is collected back and is converted into electric pulses by the photoelectric circuitry of the scanner. Further, these pulses are converted into binary information by the interface circuitry of the

scanner before they are fed to the computer, for further processing. So, the information read from barcode acts as a substitute for the same information entered through keyboard, to handle circulation/other routines of the library database.

The barcode technology is essentially a data transfer device and hence it works in perfect harmony with any of the computerised database systems. Any customisation needed at the user end can be done either by the in-house system personnel or by local solution providers.

The barcoding setup includes the barcode scanner to read the barcoded information, its interfacing with the library computer (normally done through a keyboard interface cable), the software to convert the requisite information to barcodes, and the printer.

The barcode scanners may be classified into different groups like (a) as per design (hand-held and fixed-mount) and (b) as per light source (infrared or visible).

Hand-held scanners contain no moving parts. They are compact, light and cheaper as compared to fixed-mount models. Hence, they are of interest to libraries desiring to optimise their budgetary resources. Infrared scanners can read mutilated labels; however, they need special printers. But recent times saw the dominant categorisation, as per technology, into CCD and laser scanners.

In CCD scanners, light from the LEDs is used to read the barcode information, whereas laser light is used in the latter. Accordingly, laser scanners have increased scan width and range (distance from which the labels are scanned), but they are comparatively expensive. The vendors used to offer requisite software to generate barcodes from suggested fields of library database. Since materials and readers are added only in prescribed number in a library, it will be better to avoid commercial printing of barcode labels. All required lables can be printed either on normal paper or on purchased blank labels on a dot-matrix/laser printer, as per their availability in the library. While generating lables, provision may also be made to print some other fields like author/title/user name in

normal text to identify the labels easily, as one is more comfortable with text than numbers like accession/identification number.

The user cards are normally laminated and to ensure long life of the labels on books (defective labels always lead to wrong/no reading of data), transparent cellotape can be pasted over these.

3. CODING FORMATS/ SYMBOLOGIES

The different code formats and how the information is encoded in bars is available in the literature[4]. The same information can be encoded by different schemes; however, at the user and application level, it doesn't make much distinction and the user may use any of the schemes. The same information can be encoded to and satisfactorily decoded from more than one scheme without hampering efficiency or time. Normally, limitations are imposed by the barcoding software one uses, and it is better to consult the individual operational manual for such information. Some of the common formats are:

(a) *Universal Product Code* (UPC): US standard to encode only digits, UPC-A to encode 12 digits or UPC-E to encode 6 digits.

(b) *European Article Number* (EAN): European code to encode digits, available in two variations: EAN-8 to encode 8 digits and EAN-13 to encode 13 digits.

(c) *Interleaved 2 of 5* (ITF): Supports only numeric characters but can be used for variable length.

(d) *Code-39*: Encodes capital alphabets, numerical and few special characters like $, +, %. Asterisk (*) must be used as the start and stop character. Lowercase alphabets cannot be encoded.

(e) *Code-128*: Encodes both the lower and the upper case letters, numeric and special characters found on the keyboard.

(f) *Codabar*: Encodes only numeric and few special characters and is the most widely used coding format. Generally, libraries use this symbology to encode books and borrower cards.

4. BARCODING AT THE IIT KHARAGPUR CENTRAL LIBRARY

The Central Library of the Indian Institute of Technology, Kharagpur, is one of the few libraries in the country to have a huge database of their entire collection[5]. Initially, the computerised issue return of books[6] was done by keying in the accession number of books and identification number of borrower, but this mechanism was prone to errors and also resulted in long queues at the circulation grant desk. Out of the project of Rs 10 lakh received from AICTE in 1994 for the conversion of the conventional central library into the electronic library, the Library procured 5 CCD barcode scanners (Scanteam-3000 manufactured by Welch Allyn, USA) and one HP-5Si Mx Laser Printer. It was decided to barcode books and hence, the details of books brought for issue/return were exported from the library database for generating barcode labels with accession number as the key field and the labels were printed on the laser printer using 'Softbar v1' software supplied by the vendor. The Library also received a consignment of 'Nashua Laser Labels' in 30 labels per page format as gift from one of its alumni settled in US. The system generates three labels for each book to be pasted on the back of title page, secret page and last page. To fasten the process, personnel were given honorarium and encouraged to work overtime/on holidays to barcode the entire book collection. Side by side, new books processed by the technical processing section were also barcoded before release. Out of a special operating fund of Rs 1 lakh received from the Institute in 1998, all the pending old books were also barcoded. Now, the entire collection of over 2 lakh books is barcoded.

From the academic year 1998-99, all B.Tech and M.Tech students were given a laminated barcoded library identity card (with Roll No. as the key field), and the practice of issuing separate borrower cards as per the entitlement was discontinued. This facility will be further extended to faculty, researchers, and other staff in near future. This practice not only resulted in saving a large amount of stationery for printing numerous borrower cards but also a total saving of staff time which would have otherwise been spent for filing those cards. The user can have a book in one third of the pre-barcode issue time. The faculty, students and the personnel manning the circulation desk find the barcode technology user-friendly, efficient and fast.

5. ADOPTION IN OTHER LIBRARIES IN INDIA

Few of the computerised libraries in the country like American Center, British Council, other IITs, some R&D libraries have already started barcoded circulation.

With an investment of less than a lakh, the computerised libraries can procure barcode related hardware and software. A CCD scanner can be purchased for Rs 15,000 and a laser scanner for Rs 25,000 (approximate prices in 1998) with comparable costs for relevant software. It is always better to have a feedback from the nearby libraries who use this technology before procuring one. Also, the potential vendors may be called to give a demonstration of this technology. The procurement may be carried out in one go or in stages, so that those required for barcoding active collection may be purchased first and on completion of that work, more scanners may be bought. The accrued savings for the first few years will be more than what has been invested. Further, it will also improve the status of the library which will move one step closer to realise the fourth law of library science.

6. APPLICATIONS OF BARCODING

Barcoding offers a lot of comfort and ease to handle bulk routine tasks efficiently. The application of this technology for issue/return of books is widely identified and practiced in the developed countries of the world. A few of the computerised libraries in our country have also started experiencing the fruits of this technology. It is important to emphasise that this technology is not limited to circulation work. Newnham[7] describes the barcoding of DNA samples in Britain. It is not out of place to ponder over future barcoding applications in a library. With the help of a data gathering device, the barcodes can be used to verify stock, as libraries have to resort to stock

verification, at intervals. If the provision for multiple barcodes or multi-dimensional barcoding is incorporated to handle call number information also, wrong shelving of books can be auto-detected which would help the staff to rectify the same. The individual journal volumes are handled in a library with lots of intricacies. Many a time these issues have to be taken out of the display area for xerox work. There are also chances of their shelving in wrong cabinets. These problems are tackled by using a control number for the current journal issues and barcoding them accordingly. A database of journal issues can thus be generated so that their management through cards can be avoided. If the parent institution also has a computerised accounting system, all the bills can be routed after barcoding (use transaction/any other inventory number as the key field) so that their follow up and processing are done efficiently.

Barcoding has come a long way and it is here to stay for faster and efficient library work.

ACKNOWLEDGEMENTS

REFERENCES

1. Bhaskar Raj, A.S. The barcode technology and applications. *Electronics For You*, April 1995, 99-105.

2. Pradeep, C. & Rama Reddy, E. Applications of barcode technology for library operations—experiences at IGM library, University of Hyderabad. *University News*, 36(35), 6-9.

3. Counting the bars. *Dataquest,* 1-15 March 1995, 95-99.

4. Newnes communication technology handbook. Butterworth Hienemann, 1994.

5. Jagajeevan, V.K., *et al.* Integrating library applications/databases with Web. Proceedings of SIS 98 Conference on Virtual Libraries. Central Library, IIT, Kharagpur, 1998, pp. 26-39.

6. Katna, A.K. On designing an automated circulation system for Indian environment. *Program*, 30(2), 171-75.

7. Newnham, John. The world's first DNA database. *Electronics for You*, Oct 1995, 46-48.

Contributor

Shri VKJ Jeevan is working as Assistant Librarian at the Central Library, Indian Institute of Technology, Kharagpur, West Bengal - 721302,
e-mail: vkj(@library.iitkgp.ernet.in

Vendors

(This list of vendors is only illustrative, as a lot of companies function in different cities as agents of international barcode solution providers.)

1. Great Eastern Impex Pvt. Ltd.
    Pragati Tower,
    10th Floor, 26 Rajendra Place,
    New Delhi 110 008
    Phone: 5711751
    Fax: 5754185

2. Efficient Data Processing Pvt. Ltd.
    462/4D, Shriram Bhuvan,
    N.P. Marg, Matunga
    Mumbai 400 019
    Phone: 4097092,
    Fax: 91-22-4096323

3. Symbol Systems of India
    PB No 12002,
    Azad Nagar P.O.
    Andheri (W),
    Mumbai 400 053
    Phone: 6237152,
    Fax: 91-22-6239650

4. Mangalam Enterprises
    18, Panchu Dhobani Galli (2nd Floor)
    Calcutta 700 007
    Phone: 2397765,
    Fax: 91-33-2322260

5. Datamatics Ltd.
    Unit No. 38/39, SDF II, SEEPZ,
    Andheri (E)
    Mumbai 400 096
    Phone: 8320511,
    Fax: 91-22-8366368